A Journey Through India

by

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Preface

FREEDOM HALF WON

Nine years ago, the people of India gave themselves a Constitution based on the principles of democracy and welfare It was *recognised that political* independence was only freedom half won and that the nation would have to *travel* a long and arduous road to achieve freedom from want It was with this understand ng that the country launched on the first and *second five year* plans *The objective in Gandhiji s words*, was to reach every home and wipe the tear from every eye

Although onsultation red under d enduring authoritarian discip [illegible]

Yet there is a unseen whip of historical circumstance that urges us onward In the West parliamentary democracy was the end product of the industrial revolution mass *education and social* emancipation Even in Britain universal adult suffrage was introduced only after the first World War In India however political democracy has to be the instrument for bringing [illegible] l berty

The Plan const tutes an effort on the part of the country to lift itself up by its bootstraps It has strained our resources but is *far from* ambitious in relat on to our needs Valuable assistance has been received from the United States the Soviet Un on Britain Canada Germany, Japan and other friendly countries and from a number of international agencies more not ably the World Bank This aid has helped sustain the tempo of economic development But today as in the future it is the Indian people who must work and save to accomplish the Plan

The chapters that follow attempt to tell something of the story of the Plan as it is on the ground They were published as a *series of articles in* "The Times of India" earlier this year and were written in the course of an 8 000 mile journey through India They are reproduced with minor modif ca tions in more or less the same order in which they originally appeared The chapters on the North East Front er and Kashmir and Ladakh were however wr tten in February 1956 and *June 1958 respectively They* have been included with the others further to illustrate the extraordinary complexity and d vers ty of the Indian scene

New Delhi, May, 1959

MONUMENT TO INDEPENDENCE

Of the many river valley schemes taken up since Independence, the Bhakra Project is among the oldest and certainly the most monumental. The idea of building a high dam across the Sutlej at Bhakra was conceived many years ago but the present project was taken up for execution just on the eve of partition Real work however, commenced only after Independence Together with the Damodar Valley and Hirakud projects the Bhakra Dam constituted the new Government of India's first essay in planning

The Bhakra Dam will be the tallest in the world rising 740 feet above its deepest foundations A giant project of this kind costs a great deal of money and takes a long time building The gestation period is now over and every year new benefits of irrigation and power are being derived from Bhakra to pay back an investment which will, on completion, total Rs 170 crores

The Bhakra Dam is a huge concrete wedge that bottles up the Sutlej in a narrow gorge just before it enters the plains Its shape is curious. It will be 300 feet long at the base and fan out to a length of 1,700 feet at the top It will however be 1,300 feet wide at the base and taper off to 30 feet at the top Over five million cubic yards of concrete is being poured into the Bhakra gorge in carefully designed blocks to build the dam. 3.2 million cubic yards of concrete have already been placed and concreting will continue day and night for another two years until the work is complete

The concreting operations are highly mechanised. Aggregate, cobble and sand travel four miles from Nangal to Bhakra on conveyor belts. They are chilled in cooling tanks to ensure that the concrete is placed at a uniform temperature of 65 degrees F throughout the year in order to minimise shrinkage cracks in the dam due to variations in temperature From here they are fed into a batching plant which automatically mixes the aggregate and cement to any of five different specifications. The concrete is then poured into buckets on rail cars which move on to a steel trestle bridge over the dam. Here, greedy double-cantilever and revolving cranes grab the buckets and spill the concrete on given sections of the dam as directed The whole operation is carried out with a push button efficiency that makes it appear so utterly simple Standing on the hill above the gorge, the process of concreting the dam looks like an interesting game being played by toy-men far down below

The Bhakra Dam has not been an easy undertaking A high dam has a very complex temperamental personality and needs to be treated with great respect. Although Indian engineers had built many dams and barrages before they had no experience of high dam construction So the assistance of American consultants and engineers was procured, more especially in the early stages.

receive non-perennial ('kharif') irrigation. The canal system is complete and full perennial irrigation will be possible from 1961.

... ower at two stations ... stations is proposed ... rm power. A much larger block of power ... dam where the left ... The first of five units of 90,000 kw ... the remaining units within the ... the right bank for four simular ... not yet been sanctioned. The demand for power is however growing so *rapidly that this power house will probably have to be taken up in 1962-63* On full development, the two main dam power houses will, therefore, have an installed capacity of not less than 810,000 kilowatts.

The firm power will, however, be initially only of the order of about *400,000 kw* This is because *the Bhakra reservoir will be completely filled in only eight years out of every twenty as it will only store the monsoon flood waters which are surplus to the normal requirements of perennial irrigation. Thereafter from October to June each year, water will be constantly let out of the reservoir to feed the canals. It is estimated* that in an average year the reservoir depth might fluctuate from a maxi-*mum of about* ... Now a minimum head of 400 f ... acity of 90,000 kw. per unit. Bu ... ch is the elevation *of the pensto* ... only be 53,000 kw. If one of the ... power that will be available thr ... 400,000 kw.

In order further to firm-up the Bhakra power supply, it is suggested that some of the water stored in the proposed Beas Dam should be fed *into* the Bhakra reservoir by *means of a link tunnel* If this is done it will be possible ...

... to be built for the Rajasthan ... The Beas Dam ...

A large block of 160,000 kws of power will be consumed by the *Nangal Fertiliser-cum-Heavy Water Plant* which should go into production by June 1960 Power would also ...

... even as Bhakra brings large new areas under irrigation, certain tracts irrigated by the older Punjab and Western *Jamuna Canals* have been affected by water-logging. *This has become* quite a problem *in some districts* and expert ... to ascertain its ... nducted ... logging ... Water- which ... canals, ... rise of the water-table even to

In order to excavate the foundations and begin construction on the dam, the river had to be diverted through two huge tunnels, 50 feet in finished diameter and about half a mile long Few tunnels of these dimensions had ever been previously attempted anywhere

The engineering problem has been further complicated by the poor quality of rock in the foundation and abutments No dam is complete without its abutments and in the case of Bhakra the shoulder-hills in which the dam is embedded have had to be specially treated and buttressed in order to make them together an impervious monolithic wall that will prevent the impounded waters from percolating through and damaging the entire structure The hill on either side of the dam is accordingly being doctored and consolidated with cement injections Holes are drilled into the rock and impregnated with cement under pressure until the point of refusal which indicates saturation when all the cracks and gaps within that particular section of hill will have been filled Normally, this kind of cement grouting is done at a distance of every ten feet. But the rock conditions at Bhakra are so poor that this treatment has had to be given at distances of every five feet and also at a number of midway points

Bands of sandstone and shale that cannot be treated have had to be completely amputated and refilled with mortar and concrete Fortunately, this shale can be heat treated and ground to powder to make a pozzalonic substitute for cement to the extent of 20 per cent This saving in cement has entailed an economy of about Rs 2 crores in the cost of the dam

The pozzalona plant and all stages of the synchronised concreting plant were designed and partly fabricated at Bhakra The project workshop at Nangal has made the rail-cars tubs and trestle-bridge for concreting and is fabricating the penstocks for power generation The Punjab Government may convert the workshop into a permanent establishment and utilise the accommodation that will be available in the Nangal township after the dam is completed to establish a technical school around it

The next six months will be a difficult period for Bhakra. The tempo of concreting will have to be such as to ensure completion of a series of river outlets in the dam before the coming monsoon. Thereafter, it will be relatively simple to go on to the top without the worry of being caught out by floods

The Bhakra Project will yield many benefits It will irrigate 3 5 million acres of land in Punjab and Rajasthan from which it is estimated the country will derive an additional yield of a million tons of food-grains, 800 000 bales of cotton 500 000 tons of sugarcane and 1 5 million tons of fodder Nearly 1 5 million acres of land have already begun to

BHAKRA-NANGAL

BHAKRA DAM:

Type	— Concrete
Height	— 740 feet
Length at top	— 1,700 feet
at base	— 325 feet
Width at top	— 30 feet
at base	— 625 feet
Total concrete	— 143 million cubic feet

RESERVOIR	
Storage	— 7 4 million acre feet
Waterspread	— 64 square miles
BENEFITS	
Irrigation	— 3.5 million acres
Power	— Nangal Canal — 144 000 kw
	Main Dam
	Installed — 810 000 kw
	Firm — 625 000 kw
COST	— Rs 170 crores

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The project is already
on the Nangal Hydel Canal.
to be increased to 144,000 kw
larger block of power will be available at the main dam where the left bank power house is under construction. The first of five units of 90,000 kw will be commissioned by January 1960 and the remaining units within the course of the year There is capacity on the right bank for four similar units but the right bank power house has not yet been sanctioned The demand for power is however growing so rapidly that this power house will probably have to be taken up in 1962-63 On full development, the two main dam power houses will, therefore, have an installed capacity of not less than 810,000 kilowatts

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are surplus to the normal requirements of perennial irrigation. Thereafter from October to June each year, water will be constantly let out of the reservoir to feed the canals It is estimated that in an average year the reservoir depth might fluctuate from a maximum of about 520 feet to a minimum of about 280 feet Now a minimum head of 400 feet is required to generate the fully capacity of 90,000 kw. per unit. But with a minimum head of 268 feet (which is the elevation of the penstock outlets) the capacity of each unit will only be 53,000 kw. If one of the nine units is kept as a stand-by, the firm power that will be available throughout the year will be just a little over 400,000 kw.

In order further to firm-up the Bhakra power supply, it is suggested that some of the water stored in the proposed Beas Dam should be fed into the Bhakra reservoir by means of a link tunnel If this is done, it will be possible to maintain the minimum reservoir head at Bhakra at 400 feet at which level the generators could be worked at full capacity to give 720 000 kw of firm power (with one unit as stand-by) The Beas Dam has in any case to be built for the Rajasthan Canal and work on this should ideally be taken up as soon as activity at Bhakra begins to slacken about a year hence The waters of the Beas could be diverted
Bhakra power and having
Barrage (just below th
Rajasthan Canal.

A large block of 160,000 kws of power will be consumed by the Nangal Fertiliser-cum-Heavy Water Plant which should go into production by June 1960 Power would also be needed for other large and small industries all over the State as well as for tubewell and rural electrification programmes Delhi will receive 40,000 kw of power and electrification of the railway from Amritsar to Delhi may become possible.

It is however curious that even as Bhakra brings large new areas under irrigation, certain tracts irrigated by the older Punjab and Western Jamuna Canals have been affected by water-logging This has become quite a problem in some districts and expert surveys are being conducted to ascertain its nature and extent and suggest remedial measures Water-logging has been the result of continuous seepage through the old canals, which are unlined, and the consequent rise of the water-table even to

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	Firm	423,000 kw
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His children speak Hindi more fluently but although there is a Bengali lesson in the local primary school, Motilal is sorry that they will never know the language as he does Maybe they will even forget it. In a neighbouring village, a Bengali girl has married a young Punjabi

Mr Corbett would find this odd too First, Bengali in the Terai
' a mile or two from Motipur It
is one of the elders, belonged to
in West Pakistan. He too is a re-

Jamunadas works much harder than Motilal but he only gets a fraction of the yield he got in Lyallpur with its rich, irrigated lands The same breeds of cattle also *somehow give smaller milk yields* Still, Jamunadas is not discouraged *In a few more years he thinks he will* be able to attain the Lyallpur level. Motilal *grumbled that none of the* officers around here understood Bengali. But even he was convinced that his children had a good future in Motipur

Jamunadas and Motilal *have not met* Jamunadas of course, knows
Five years
ir children
e subjected
attend the

The displaced person
categories of settlers to
the area Plots ranging
labourers, ex-serviceme agricultural graduates and political sufferers ... have been allotted *to landless* The ex-servicemen and agricultural graduates *are* reported to be doing well. But the landless peasants have often been unable to cultivate all their newly *gifted* land on account of paucity of resources

Much of the land of the political sufferers has in the past either been 'rented' out or sometimes even lain fallow Co-operative finance and co operative seed stores have worked, although they are *not described as having been* an outstanding success. Co-operative farming in 25 *societies of political* sufferers has however failed *and* been abandoned

The nucleus and *hope* of this vast reclamation belt is the U.P Government's Terai State Farm. Spread over 16,000 acres, the Farm is an invaluable centre of experimental research in all branches of agriculture It grows improved strains of wheat, hybrid maize and other crops and sells the produce to the Government seed store for distribution and sale Improved and pedigreed breeds *of* milch and draught cattle and poultry have been developed and supplied to the Department of Animal Husbandry Local fodder and manurial grasses are being cultivated and developed So also a variety of agricultural timber Many acres of fine orchard have been cultivated and a fruit preservation *plant* may follow

U.P. TERAI COLONISATION SCHEME, RUDRAPUR

Period of Reclamation	— 1948 50
Area reclaimed	— 100 000 acres
Terai State Farm	— 16 000 acres
221 new villages have been settled	
Land allocations:	
Displaced persons	— 25 000 acres
Political sufferers	— 12 000 acres
Ex Servicemen	— 2,600 "
Agricultural graduates	— 540 "
Landless labourers	— 3 400 "
Local tenants	— 5 100 "

ground level in some cases It is also believed that the construction of canals, roads and railways have affected the natural drainage of the country which has in turn accentuated the problem of waterlogging

A solution must therefore now be found in pumping out water through tubewells to lower the water-table, treating the affected soils and improving the natural drainage The long term solution lies in lining the offending canals The Main Canal and branches of the Bhakra system are lined Ultimately, the goal, not only in Punjab but throughout the country, must be to line all canals down to the field channels (where the greatest seepage occurs) not necessarily to prevent waterlogging but also to conserve valuable water for additional irrigation

Meanwhile, in another two years, the Bhakra Dam will be complete It will stand strong and sure, a monument to the peasants and artisans of India whom it has been built to serve

BHAKRA, *February 18, 1959*

THE VANISHING JUNGLE

RUDRAPUR is Jim Corbett country But although a tiger carried away two head of cattle from Motipur village only last month Mr Corbett would never believe he had hunted maneaters in just this part of the U P Terai if he were to return here today The jungle and swamp have
operations carried out by the Central
maneaters have virtually disappear-
ject sponsored by the U P Govern-
s of utterly inhospitable land under
initial and Rampur *terai* The area
now supports a sophisticated and increasingly prosperous agricultural community and perhaps the largest concentration of mechanised farms in the country

Mr Corbett would be very surprised for another reason At Motipur, some four miles out of Rudrapur, he would find a village that looks just a little different It is different It is a Bengali village, one of 36 similar Bengali villages in the area The Bengalis are refugees from East Pakistan

Motilal Mondal lives at Motipur He came here about six years ago after spending some months at a displaced persons camp near Burdwan He used to live in Shankardani village in Khulna District Today Motipur is his home and the village is named after him Like the other three or four thousand Bengali refugees who have been resettled in the area, he has been allotted eight acres of land and a house and was given an initial loan of Rs 800 to buy a pair of bullocks and maintain himself and his family until the first harvest.

Motilal has adjusted himself to his new surroundings He has taken to *chappatis* but would like a little more fish He speaks his own Hindi

are 'pilot projects' such as improved rural latrines which are sanitary and provide manure; smokeless *choolas* of various designs; and a cow-dung gas plan ... able to produce enough gas to supply ... with an input of 100 lbs. of dung per day. ... ovide this quantity ... which could be used for manure after going through the gas plant). ... development

uses improved seeds. The seeds are ... spacing pattern. Line sowing (dibbling) ... *operations and ensures* that ... the same stem (tillering). By ... ng enables a farmer to get a ... s seed.

The ... on is gaining popularity. This entails dibbling, the use of improved seeds and application of 60 lbs. of fertiliser per acre sown. Most of the farm-yard manure is still unfortunately burnt as fuel and *lost to the soil. This will continue as* long as the ... not set aside enough common land to grow cheap fuel timber. ... On green manur- ... a have been intro- ... ed. Some farmers have been persuaded to eliminate the fallow in their cycle of rotation. Growing green manure on the *borders of fields* and on strips is still relatively uncommon.

Mixed cultivation is an interesting phenomenon in Rampur village. One line of gram is sown ... a form of insurance as th ... times and the farmer is ... It is sometimes even possible to grow a quick maturing crop in between the wheat crop, harvest it and grow something else again while the wheat matures.

Few peasants cultivate fodder crops. They usually say they cannot afford to do so. This is a vicious circle which has to be broken at some point if the village livestock is to be improved.

Rampur village is a typical example of the old and the new in rural India. I was shown a fine field of peas. A few minutes later, a decrepit old cow limped into the field and began eating the peas. An extension worker told me that up to 25 per cent of the standing crop was normally destroyed by *pests—rats and monkeys mostly* and by stray and useless cattle and birds to a lesser extent. He confessed that very little was

COMMUNITY DEVELOPMENT

(As on January 1, 1959)

Number of blocks	— 2405	V.L.Ws. under training	— 50,200
Villages covered	— 3,02,947	Number of Gram Sevikas	— 1,500
Population	— 165 million or 56 per cent of the rural population	Number of training centres	— 167
Number of V.L.Ws.	— 50,200	Number of Co-operatives in blocks (as on Sept. 30, 1958)	— 127,125
		Number of members	— 8.8 million

the dairy which has already been set up and supplies Naini Tal with milk and butter

The Farm was started ten years ago It was a pioneer venture and has succeeded under the drive and guidance of its General Manager, Major H S Sandhu. Today the Farm operates just under a hundred tractors But Major Sandhu recalls that in August 1947 a survey party of which he was a member could not reach a semal tree barely 50 yards from the Naini Tal Road. The party made three attempts on elephants but was turned back on each occasion by impenetrable jungle and stinging insects Today, the same semal tree stands sentinel over rich farmland.

Wheat yields on the farm average 1312 lbs per acre (dry farming) Local yields are far lower Chemical fertilisers are not used Only green manures and compost Milk yields have touched 46 lbs per day for cows and 56 lbs per day for buffaloes Local yields average 14 to 16 lbs Egg production has been increased from 78 to 165 per hen per year Progress has been good, but the problem, the national problem, still remains It is to carry this progress to Motipur and Kesarpur and to Motilal and Jamunadas

The Terai State Farm hopes to be able to do this within a few years The Farm is to be made over to an agricultural university which will be located in its midst The new institution will combine teaching with demonstration, research and extension It is hoped to be able to persuade each district in the State to provide two scholarships every year for students from local villages The university might in return take over all extension work in the Kumaon and Bundelkand Divisions This would be a practical and useful arrangement that would relate the young agricultural technician to the soil The State Farm has been a splendid and profitable achievement assisted by the Rockefeller Foundation and T C M The Agricultural University will be an equally exciting adventure

RUDRAPUR, *January 12, 1959*

NEW PATTERNS FOR OLD

BAKSHI-KA-TALAB would be like any other village in Lucknow District were it not for the fact that the oldest (post independence) Extension Training Centre is located there Village level workers from Uttar Pradesh go there for two-year courses along with block development officers and I.A.S and provincial Civil Service officers drawn from several other States who attend shorter and more intensive courses on community development and agricultural extension

Bakshi ka-Talab is an important institution The ideas planted here might take root as far afield as Madras, Mysore Bombay or Rajasthan. The Centre is a laboratory where ideas and programmes are tried out in discussion and actual ground experiment. On the campus there

are 'pilot projects' such as improved rural latrines which are sanitary and provide manure, smokeless choolas of various designs, and a con-

Bakshi ka-Talab is the headquarters of a community development block. In Rampur village, a few miles away from the block headquarters,

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pelled larger farmers to cultivate their holdings intensively and efficiently Many large holders have sold their 'surplus' land in order to retain only what they can cultivate intensively as an effective economic unit

An experienced farmer told me that up to a point, the size of a farm did not matter What was supremely important was the farmer's ability to cultivate it For this he needed capital or the necessary security against which he could raise capital. The Nagpur Congress (January 1959) has declared co operatives to be the answer

LUCKNOW, *January 13, 1959*

BOTTLED ENERGY

MIRZAPUR has long been the centre of a flourishing carpet industry But it has had little to boast of as the district headquarters of one of the most backward areas in eastern Uttar Pradesh. Today, however,
which it proudly enjoys This has
ituated in the southern most tongue
'Iadhya Pradesh and Bihar

The Rihand is a little river It rises in the Vindhyas and flows through rather inhospitable hills and scrub jungle The dam site is at Pipri, about 30 miles above the point where the Rihand flows into the Sone The dam will be a straight concrete gravity structure like Bhakra, though smaller It will be about 3,250 feet long and 300 feet high Although Rihand will contain only half the concrete content of Bhakra it will store considerably more water in a giant 180 square mile reservoir, reputedly the largest artificial lake in India in point of area.

Unfortunately, very little of this water will be available for irrigation for Rihand is primarily a power project and its immediate vicinity too hilly for canal irrigation. The project is designed for an installed capacity of 300 000 kilowatts and 105,000 kilowatts of firm power

Five thousand cusecs of water will have to be let through the dam to generate this power and this regular flow will be available for direct
t the Sone canals In U P itself
be used in part to energise up to
which are scarcity areas Some
drilled and are being supplied

Rihand power will replace this more expensive energy and will also feed the new tubewells proposed to be constructed. This indirect irrigation benefit is expected to cover some 1 6 million acres in U P and another 500 000 acres in Bihar The project authorities estimate the additional food output on this acreage at about 325 000 tons Irrigation in eastern U P can certainly bring new life to a derelict area

Rihand power will also attract industry The State Government's cement factory at Churk, some 50 miles north of the dam site, was a pre-

being done about this matter Elsewhere however, a 'gentleman farmer' complained bitterly about the Government s policy of preventing slaughter of useless cattle He described these cattle as a menace to agriculture and cattle development An extension worker whose views I sought mumbled something about strong local sentiment and turned to another subject

Another paradox at Rampur was non utilisation of tubewell irrigation. The village tubewell (which costs about Rs 30 000) can irrigate some 600 acres But it is at present only being used to irrigate about half this area A local farmer explained that the water rate was very high. (Tubewell water rates are two to three times higher than canal water rates) An extension worker further explained that a change-over from dry to wet farming would only be really worthwhile if the entire crop pattern was changed and the farmer practised intensive cultivation He would be able to introduce cash crops and grow a double crop The benefits are there But the farmer has to be educated to utilise irrigation and persuaded to work harder This process of education does not appear to have gone far enough

The community projects need a new dynamism This will perhaps come with the decentralisation of the administration below the district level Uttar Pradesh has already abolished the district boards and combined their membership with that of the existing district planning advisory councils to form interim *zila parishads* (districts councils) Details of the programme of decentralisation are being worked out and the necessary legislation is to be introduced in the next session of the Assembly The directly elected panchayat will form the base The panchayats will indirectly elect the block *samitis* which will in turn elect the *zila parishads* The *zila parishads* will be given enhanced administrative and financial powers and will be the main agency for directing and stimulating developmental activity Uttar Pradesh has already broken down its Five-Year Plan into district plans and block plans The success or failure of these plans will increasingly rest on the initiative and resourcefulness of the popular councils

Two panchayat elections in 1952 and 1957 have accentuated caste consciousness to a considerable extent But experienced administrators put this down to the fact that panchayat elections in the past have been held by show of hand. Such a procedure has obvious limitations It is now proposed to utilise the proceeds of sale of nomination papers for the panchayat elections to finance a simple and inexpensive form of secret ballot Even at present however experience has shown that although previous panchayat elections may have been fought on caste lines this has not by itself prevented the various groups in the village from co-operating thereafter This is probably because of the interdependent social structure of the average village

The question of ceilings on holdings is another matter that makes village conversation these days Word has gone round that something is in the air and there is a consequent feeling of uncertainty Uttar Pradesh has never been enamoured of ceilings but has cleverly achieved much the same result and rather more painlessly by imposing a tax on large holdings (above 30 acres) on a graded slab system. The tax is on the size of the holding and not on the output or income and so there is no disincentive to production. On the other hand, the measure has com

Unaccountably, however, the Company has not been offered any bonus if it completes the job ahead of time Such incentives are stated to be against the Government's normal contract rules and some of the official engineers doubt whether such a scheme would work. They fear it might result in undue costs, shoddy work or corruption These arguments do not sound wholly convincing Tradition and rules die hard. Every day's work is, after all, supervised by official engineers who are on the spot alongside the H C C men.

The H C C [illegible]

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the country One amiable Sikh, who has been with the firm for 20 years, said he had built the fort at Las Bela and a dam in Ceylon Labour amenities appear satisfactory.

The H C C has its Deputy General Manager at Rihand and maintains daily wireless contact with Bombay.

The T C.M is contributing about Rs. 4 5 crores of foreign exchange and Rs 7 crores of rupee finance towards the cost of the project. It has also two consultants at the site

Concreting goes on round the clock and as the dam rises about 105 villages inhabited by 40,000 people will be submerged. These villagers are being compensated and rehabilitated elsewhere Work is progressing smoothly and a few months lag caused partly by the Suez hold-ups has been almost made up by working through the last monsoon

Rihand will make a difference to eastern U.P.

MIRZAPUR, *January 14, 1959.*

A PEOPLE'S PROJECT

THE Kosi project is one of the most stimulating that has been undertaken since Independence Structurally, it is not as impressive as river-valley projects in India go But what makes it exciting is its tremendous human quality The people of North Bihar have been fighting the Kosi for centuries It was a losing battle Even today you can see the remnant of a *bundh* built over 700 years ago by Raja Bir Singh to contain this wayward river in its course and arrest its westward movement The Bir *bundh* may have served its purpose for a while In time, however, the Kosi won and in the last hundred years has 'migrated' about seventy miles to the west leaving behind a sandy waste, unfit for cultivation and unable to support the population it once fed with such bounty Even today, the country between Purnea and Birpur, on the Indo-Nepal border, is desolate Such cultivation as there is, is poor. *Kans* and tiger grass abound.

cursor to the project The dam is being built with Churk cement The cement plant has an output of 700 tons per day but this is proposed to be doubled in due course A 50 mile railway line has already been constructed from Chunar, near Mirzapur, to Robertsgunj (Churk) and this may soon be extended to Pipri and beyond to link up with the main line further south This would further open up the region, the economy of which has already been stimulated by the roads and bridges constructed from Mirzapur to Pipri and its neighbourhood by the Project authorities.

Cheap power from Rihand would make possible the location of an aluminium industry in the area and negotiations to this end are in fact already in progress Rihand power could also be used to feed the U.P grid and bring additional electricity to the eastern districts Some Rihand power may be utilised for electrification of the railway on the Gaya-Mughal Sarai section Rural electrification could stimulate local industries

It may be possible to firm up Rihand power subsequently by generating another 32,000 kilowatts by building a barrage and power house 30 miles down the river at Ubra and by augmenting thermal capacity in the area

The Rihand project was conceived many years ago A detailed project report, prepared in 1952, put the cost at Rs 35 crores Three years later, tenders were called for the construction of the dam and the contract was awarded to the Hindustan Construction Company of Bombay at a cost of approximately Rs 17 crores By this time however, the project estimates had gone up on account of the rising cost of materials a decision to extend the transmission system and certain other factors The revised estimate of Rs 46 crores was only approved last March by the Rihand Control Board.

The Hindustan Construction Company has considerable experience behind it It built the Vaitarna dam in Bombay and has just completed the Ganga Bridge at Mokameh It is currently engaged in civil engineering contracts at Bhilai and Koyna and in respect of the Brahmaputra Bridge

At Rihand the Project authorities (the U P Government) are merely responsible for the supply of cement steel and certain other materials at fixed prices. Beyond this all procurement and assembly of stores and equipment and the entire construction of the dam and power house is the responsibility of H C C The Company has to deliver the dam to the Project authorities by June 1961 Unavoidable delays such as import hold-ups—the Suez crisis did delay the arrival of considerable equipment intended for Rihand—may be condoned. Otherwise there is a penalty clause

RIHAND PROJECT

DAM:

Type	— Concrete
Height	— 296 feet
Length	— 3,234 feet
Volume of concrete	— 60 million cubic feet

RESERVOIR:

Storage	— 8.6 million acre feet
Waterspread	— 180 square miles

BENEFITS:

Power	— installed 300,000 k w
	— firm 105,000 k w
Irrigation	— [illegible]00,000 acres in Bihar through Sone Valley Canals
Flood Control	
Navigation	— on Rihand 28 miles
	— on Sone 110 miles
Cost	— Rs 45.26 crores
Completion Date	— 1961

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The principle underlying the activities of the B.S S has been to educate the people regarding the project and organise them for assisting in its implementation The co-operation of the people has been won As a consequence peasants have parted with land for the embankments and canals in advance of receiving compensation and without waiting for the tortuous formalities of the Land Acquisition Act to be completed This alone has expedited work enormously Panchayat *mukhias* and secretaries of co-operative societies have been appointed 'unit leaders' for raising peasant levies mostly locally, to work on the embankments and canals under the organisational and technical guidance of the B S S and project engineers respectively The quality of earthwork has been satisfactory and piece rate earnings have steadily increased as the peasants have adapted themselves to the job Proper accounts have been maintained and full wages paid. There have been no ugly reports of corrupt practices

The existence of an alternative construction agency has greatly strengthened the hands of the project authorities vis a vis the contractors. Contract rates for earthwork have declined from Rs 28-35 per 1000 cubic feet to a little less than Rs 15 in three years The B S S has been offered contracts for sections of the embankments and canals on the basis of rates established by the project authorities in relation to the lowest tender The contract rates have tumbled for another reason The project authorities have broken down every contract to the smallest practicable unit Contracts have been given for even as little as fifty feet of embankment This fragmentation of contracts has brought employment and income to local contractors with petty capital who have been able to make competitive bids on account of their very negligible overheads and establishment charges The rates for stone apron work on the barrage—where the B S S has not operated—has been lowered by this means from Rs 12-8 per 100 cubic feet in 1957 to Rs 10-8 in 1958 and Rs 5 this year

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The B S S was able to get up to 45 000 peasants to work on the embankments last year This has been a tremendous employment factor, especially for landless labourers, and, together with other project expenditure has pumped a great deal of money into the economy of this backward region With its lower overheads and non profit motivation the B S S has been able to distribute as high a ratio as 85 per cent of its takings as wages Five per cent has been given to the 'unit leaders' for their expenses while another five per cent has been retained

In mythology, the story goes that the westward movement of the river was an attempt on the part of Kosi to meet her sister, Kamla, which flows down the adjoining valley. This is a charming legend. But whatever the reason for the vagaries of the Kosi, it cost the people dear. It became Bihar's 'River of Sorrow'.

The Kosi has however now been successfully contained for at least the period of a generation. Two earthen embankments, tied to the four-mile barrage being constructed across the river at Hanumannagar, just within Nepal, have confined the river to a relatively straight and narrow course. The embankments run 75 miles on either side of the present main channel. The distance between them varies from three to ten miles and nearly 150,000 acres of cultivated land has fallen within the newly-licensed bed of the Kosi. A population of about 115,000 persons living in some 300 villages has to be rehabilitated. Theirs is an unenviable lot, but the sacrifice has been accepted with a willingness born of an understanding of the great boon of complete immunity against the Kosi conferred on hundreds of thousands of people living outside the embankments in an area of 6000 square miles. There is also knowledge that about 1.4 million acres of derelict land will be irrigated in the first stage and possibly as much again in subsequent stages. Nepal too will enjoy smaller irrigation and power benefits.

The fact of flood protection is real, immediate and visible. People are beginning to migrate back to the lands they were once compelled to leave and the cheap, temporary, bamboo-thatch huts characteristic of the area have begun to give way to more solid and permanent dwellings with galvanised iron roofing. These new houses are not built just for a season or two. They are for a lifetime.

The Kosi project has not only conferred a large, tangible, human benefit. It has evoked an equally great and inspiring human commitment. The undertaking has not merely been an administrative responsibility, somebody else's concern. The Kosi has been everyone's problem and so the project to tame it has become everyone's business. This human commitment to the project has been harnessed to the task of implementing it by what has come to be known as 'popular co-operation'. Three years ago the Bharat Sewak Samaj decided to organise the peasants of the area for work on the embankments. After an uncertain

KOSI PROJECT

BARRAGE:	
Type	— Concrete and Earth
Length	— Four Miles
Concrete Spillway	— 3,769 feet
Eastern & Western Afflux Bundhs	— 16 miles
FLOOD EMBANKMENTS:	
Length	— 75 miles on either side
Height	— 12 to 15 feet
Top width	— 15 feet
Distance between embankments	— 3 to 10 miles
BENEFITS:	
Flood Protection	— 6,000 square miles
Irrigation	— Stage I — 1.4 million acres Stage II — 3 million acres
Power	— Stage II — 15,000 kW
Cost of Stage I	— Rs 44.76 crores

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The total savings have been considerable Work estimated to cost Rs 18 crores has so far been completed for Rs 16 crores The embankments have also been virtually completed one season ahead of time This is a brilliant achievement and quite contrary to the experience of most other projects The credit must go to the Chief Project Administrator, Mr T P Singh and his colleagues as well as to the B S S which has been able to organise as much as 45 per cent of the work on the two embankments through public co-operation

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by the B S S to cover its administrative costs and make a contribution to the central reserves of the organisation The remaining five per cent has been put into a community savings fund which is to be utilised for financing local works in the villages from which the peasant labour has been drawn

The economic gains from the project investment and the B S S activity have been numerous A statistical survey has revealed that seasonal distress migration from the Kosi area for employment in the tea gardens of West Bengal and Assam has diminished Local family incomes have risen and indebtedness has declined. The period of dependence on rice-loans by the poorer sections of the community has fallen from seven months to three months There has been less resort to borrowing for marriage expenses And living standards have improved as exemplified, for instance, by the increase in the number of quilts per family

To this must be added a list of equally significant social gains B S S labour has brought together persons belonging to communities that would normally never mix Brahmins Rajputs and Bhumihars have sat together with Harijans for meals in B S S *shramdan camps* Public co-operation has been of great educational value and has helped awaken a community spirit and outlook What now needs to be done is to utilise this experience for co-operative village action in other directions such as agricultural production and community development in all its aspects Public co-operation has sown a seed. It has revealed tremendous possibilities which must be pursued. Local leadership will be supremely important and the ideal of community service will be destroyed if unit leaders' tend to become petty contractors as has been noticed in some cases

The Kosi project is novel in other respects Two days ago I attended an extraordinarily interesting 'public meeting' at Bathnaha head quarters of the canal division of the project About five hundred villagers and local leaders sat under a *shamiana* alongside the Chief Project Administrator, canal engineers and the Rehabilitation Officer to discuss the alignment of certain canals which were shown on a series of large wall maps The proposed course of the canals had some weeks earlier been marked on the ground and the purpose of the meeting was to discuss objections and alternatives before work was actually commenced One by one villagers rose to inquire why the canal should not be given a different alignment at some point or other The engineers explained the technical difficulties and offered to walk over the ground with the local people to examine their suggestions Others called attention to the need for providing access roads and bridges over the canals for themselves and their cattle The points were noted It was a most lively discussion It symbolised the close identity between the project and the people The project authorities have responded to the people and the people have responded to the project

Since wet farming is to be introduced in a new area the Bihar Government has taken preliminary action to plan the future crop pattern after conducting appropriate soil tests Thereafter the peasants will be educated in the new techniques Three demonstration farms are proposed to be set up in the region.

The Kosi project will cost Rs 45 crores and will be completed in 1962 It is however only designed to provide an interim solution to the age-old problem of the river—very heavy silt deposition immediately be

low the point of entry into the plains which has created deltaic conditions A permanent solution is under study This may entail a high dam above Hanumannagar Meanwhile soil conservation work is in progress in Nepal But the catchment area of the Kosi, which drains the Himalayas between Everest and Kanchenjunga cannot obviously all be afforested The Kosi has not yet been finally tamed. The present project has only bought time.

BIRPUR, *January 16, 1959*

FERTILISER FOR THE FARMER

THE Sindri fertiliser plant perhaps shares with Chittaranjan the distinction of being in the very first group of completely new industrial projects undertaken in the public sector after independence The project was begun in 1948 and completed three years later

When Sindri decided to go in for a 60 per cent expansion programme a few years ago part of the task of design and erection was entrusted to its own Projects Division The Projects Division undertook the construction of a complete ammonium sulphate plant and a number of cooling towers the installation of gas compressors and generators and the provision of water supply and power facilities The programme has almost been completed

With this experience behind it and the full confidence of its Board of Directors Sindri has now been awarded a Rs 8-crore contract by Hindustan Steel for the complete design and erection of part of the proposed Rourkela fertiliser plant The Rourkela project is expected to cost about Rs 16 crores (excluding township and other facilities) and will produce nitro-limestone corresponding to 80 000 to 100 000 tons of nitrogen per annum (which is roughly equivalent to Sindri s initial output) The young engineers in the Projects Division at Sindri are naturally elated They have been given an opportunity, and they are out to show that they can do the job quickly, efficiently and economically Talking to them one feels sure they can. The new project is being nursed with maternal care and pride Rourkela Fertilisers will be the public sector's first grandchild

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exchange component included in the lowest foreign tender. This valuable saving will be possible because of the elimination of foreign technical services and the greater utilisation of indigenous capacity in the fabrication of plant that Sindri will ensure Even in the current expansion programme, the Projects Division was able to reduce the foreign exchange content of the ammonium sulphate plant it built to Rs. 25 lakhs in a total cost of Rs 130 lakhs Orders were placed on Indian firms as far as possible

Designing of the new plant has already begun and Sindri will be ready to start work within four weeks of the site being made available at Rourkela Sindri's programme of training engineers for the proposed new fertiliser plants has created a pool of technicians who will be at hand to assist in the Rourkela project. But more drawing office staff and engineers will have to be recruited

The Rourkela plant is only one of several new fertiliser plants proposed to be set up in the immediate future at Nangal, Neyveli, Trombay and other places Many, many other fertiliser plants must follow In view of this, it is obviously desirable that a nucleus of design, technical and equipment manufacturing capacity should be developed within the country itself This is now being done

When Sindri first went into production, the sceptics scoffed as stocks of ammonium sulphate accumulated for want of demand even though the plant had not attained full capacity The position today is exactly the reverse The demand for fertilisers has shot up and, despite imports, supplies are far short of the requirements It is quite clearly realised that next to irrigation, the application of chemical fertilisers perhaps offers the surest and speediest means of achieving higher agricultural production

Sindri has done well It has exceeded its targets of production during the last three years and as its output has gone up its cost of production has come down Sindri fertiliser is among the cheapest in the world

A party of 512 Rajasthani kisans drawn from 64 community development blocks in that State visited Sindri a few months ago The peasants knew about ammonium sulphate, yes But what they did not know and were delighted to learn was that a lot of Rajasthani gypsum went into the production of this fertiliser

The Indian peasant has become fertiliser-conscious and has begun to want more and more of it What is to be the source of this increased supply and how can it be produced more economically?

FERTILISER PROJECTS

	Capacity (In terms of nitrogen)	Cost (In rupees)	Target date	Products
SINDRI	120 000 tons	34 crores	completed	Ammonium sulphate Urea and double salt
NANGAL (with Heavy Water Plant)	80 000 tons	30 crores	June 1960	Nitro-chalk
ROURKELA	80 000 tons	18 crores	September 1961	Nitro-limestone
NEYVELI	70 000 tons	20 crores	March 1962	Urea
TROMBAY	90 000 tons	24 crores	not before 1962	Urea, etc.

The Central Fuel Research Institute, which is located at Jealgora five miles from Sindri, has something to say on this subject. This might sound odd to the layman. But it is not. Coal provides the link between fuel research and fertiliser. After all, it was not so very many million years ago that our present-day coal was nothing more than humus-compost. India has any amount of low-grade coal and lignite and the Fuel Research Institute has been able to evolve a process for converting this into ammonium humate, a fertiliser containing 12 to 15 per cent of nitrogen. The process consists of passing ammonia and oxygen over coal and has proved economic on a semi-pilot plant scale.

The Fuel Research Institute has tried out the new fertiliser in a field experiment in its backyard and has just harvested a bumper crop of *kharif* paddy. The experiment will have to be tried out on a larger scale and over a period of about five years before it can be declared free of other possibly deleterious effects and pronounced a success. Meanwhile, the Fuel Research Institute will not take responsibility if anybody decides to plant coal with his roses.

SINDRI, *January 17, 1959*

THE MAN IN THE LAB

AMONG the earliest policy decisions taken by the Government of India soon after independence was one to set up a chain of national research laboratories. The Prime Minister was a major driving force in getting these institutions established and endowing them as well as the country could afford. The investment was a very wise one. It has begun to yield dividends. Teams of young, eager Indian scientists are exploring and developing new fields of science and technology on which the future of the country so largely depends.

Take steel. The three new steel plants constitute the core of the Second Five-Year Plan and will provide the sinews of the Third. A sudden step up in steel output from one and a half to six million tons would never have been possible if the Central Fuel Research Institute at Jealgora had not already established that in the absence of sufficient quantities of coking coal, certain varieties of non-coking coal which are found abundantly in this country could be used for metallurgical purposes if suitably washed and blended.

For example the Durgapur steel plant will use a blend of 75 per cent of high volatile Raniganj coal which will save it about Rs. 75 lakhs per annum on transport. Similarly, the Bhilai steel plant will be able to save up to a crore of rupees every year by using 20 to 40 per cent of local coals which are to be suitably blended and upgraded. Rourkela will utilise coal washed in the Kargali washery at Bokaro. The Institute assisted in designing the washery, the largest in the East.

Coal is at present and, in view of its plentitude, is likely to remain the primary source of energy in India in the immediate future Since accurate data about the quantity and quality of our coal resources was lacking, the C.F.R.I commenced a programme of physical and chemical survey through a number of Regional Coal Survey stations established under its auspices in all the major coalfields These surveys have incidentally led to the discovery of new sources of coking coal in Jharia and coal for blending in Madhya Pradesh

Since high-grade coal is a scarce commodity it must be used to the best advantage A statistical survey conducted by the Institute has revealed considerable room for fuel economy in India It is now known that in the public utilities and power stations, the average boiler efficiency in the country is only 17 per cent as compared with 27 per cent for the British Electricity Authority This sounds tedious and dull, but it is a fact of great economic significance The C F R I is helping the Plan by trying to promote boiler efficiency

India's large reserves of low grade coal present a great challenge They constitute a tremendous potential asset if they can be economically upgraded, burnt to produce electric power, converted into oil or gas or 'distilled' into chemicals The C F R I is engaged in the task of seeing just how this can be accomplished

With the development of the economy, the country's requirements of oil are on the increase, more especially diesel and furnace oil—the so-called middle distillates or fractions contained in crude petroleum The C F R. I is trying to evolve processes which will permit the production of diesel oil from low-temperature tar and high boiling petroleum crude The layman probably would not understand what all this is about but he should be glad that some people are bothering themselves over this problem

The desirability of trying to produce cheap synthetic oil from low grade coal is a more understandable proposition At Jealgora near Dhanbad in the heart of the Jharia coalfields I was told that coal was practically the same as oil except that oil contained just a little more hydrogen I said 'Oh Yes"! In Jealgora, however they take this kind of thing seriously A lot of young men spend a great deal of time trying to coax a little more hydrogen into coal They have already met with some success Project reports for the manufacture of synthetic oil have been prepared by two reputed foreign firms on the basis of a process of low-temperature carbonisation of coal devised by the Institute These project reports confirm the C F R I's claim that motor spirit can be produced from synthetic oil for 12 to 13 annas per gallon Earlier project reports based on other methods have never been taken up on account of the very heavy investment involved. The Institute has found the answer The low-temperature carbonisation of coal method has this great advantage that it yields cheap domestic coke as a by product the sale of which renders the manufacture of synthetic oil economic

The Institute has done useful work in other directions It has been able to extract a resin from coal tar acids which can be compressed with saw-dust bagasse, jute or any waste material to produce very good hard-board Patents have been taken out and several private firms are now manufacturing this item Four large pilot plants have been erected to

test four different processes for the gasification of coal and work is being done on the "distillation" of coal into chemicals and drugs

The major work on drugs is, however, being done by the Central Drug Research Institute (D.R.I.) in Lucknow. When Saadat Ali, one of the later Nawabs of Oudh, built himself the Chattar Manzil some ... become ... icals to ... would ... would give way to an Animal House consisting among other things of a fowl run, a rabbit exercise area, a pigeon enclosure, a monkey den and a froggery. This might have killed him. As a matter of fact he is dead. So now the scientists have free run of the place.

People often wonder what really goes on inside Chattar Manzil. They complain that they have not seen anything spectacular happen in nine years. But this is only because they are not aware of what is going on within the old palace walls. The frogs and rabbits know ... year (or would if it h... people are killed or dis... leprosy, filaria, leucoderma, dysentry, typhus, etc. for which there is either no remedy, or remedies that call for and admit of considerable improvement.

Then again, India possesses age-old systems of indigenous medicine which claim varying healing powers through the use of certain herbs. All this provides a vast and exciting field for the medical chemist and research ... ly set itself the tasks of prepar... rugs, both indigenous and allo... diseases such as T.B., leprosy, ... malaria and viral infections.

The Institute has analysed several plants ... common to Indian medicine ... and to lack ... d valuable ... ncouraging ... long used ... ontractions, ... Similarly, ... yielded a ... nt is a

... that certain viruses in the human body tend to lose some of their original viru... engaged in examin... into the ... ments c... skin ... ase, a virus infection ... by adenosine-3 phos... material contained in ... phosphate but which is not absorbed into the human system ... now to synthesise a compound akin to adenosine is and which can therefore be used as a drug.

In the line of anti biotics, a large variety of local soil samples are being intensively screened to analyse their 'microbiological flora'. The D.R.I. has been able to culture a local Lucknow soil specimen to discover

X-340, a substance similar to aureomycin and terramycin Further tests are in progress

In ten years, the National Laboratories have each built up the facilities necessary for research—personnel, equipment, libraries and much basic groundwork. The young scientists who work in them are among the nation's richest assets These Institutes are not extravagant white elephants as many people tend to believe Much good work has already been done in them. And much more will be heard about them during the next ten years

JEALGORA, *January 17, 1959*

PYLON AND CHIMNEY

THE open field and forest is fast disappearing in the D V C belt Perhaps some brown bear still come to drink the nectar of the mahua flower in Chota Nagpur but most of them must be frightened away by the bustle and activity in the area The landscape has changed in ten years To the squat, black colliery winch towers has been added great artificial lakes, graceful silver-grey pylons and not so pretty chimneys belching smoke

From Hazaribagh to Durgapur new mines and technical institutes are springing up while the ribboning industrial development along the Grand Trunk Road has transformed this highway into something very different from the dusty, rustic road and Imperial corridor that Kipling once described. The Damodar Valley Corporation has contributed greatly to this change, for power begets industry

The D V C area contains the largest concentration of high-grade mineral wealth—coal, iron ore, copper and mica—in the country But when the project was first designed it was primarily intended for flood control with power, irrigation and navigation as secondary benefits The utility of flood protection has been fully proved but the major demands on the D V C. today are for industrial water—a contingency not contemplated in its original charter—and power

Sindri, Hindustan Cables Chittaranjan the Durgapur Steel Plant and Coke Oven project, the heavy machine building group of industries, the Kargali and Dugda coal washeries the proposed two-million ton steel plant at Bokaro and a host of private industries are already in production or at a stage of advanced planning They need water for cooling purposes and, of course, power When the D V C first built its 150 000 kilowatt thermal station at Bokaro some critics were sceptical about the prospects of utilisation of this energy Now, with burgeoning industrial development, even the railways find that they can only carry the freight offering by electrification of considerable sections of the Eastern Railway It is now estimated that industrial loads may be expected to develop at the rate of 125,000 kilowatts per annum for the next seven years

The D V C is going to supply the power It already has an installed capacity of about 250 000 kw of which 150,000 kw comes from the Bokaro thermal station and the rest from hydel sources—Maithon, Tilaya and Panchet (from June, 1959) To meet th area, the Bo two new equirements of the Chandrap 225,000 kw while 625 000 k (150,000 kw) and taken up expansion up to of at least 1 3 million kw of D V C power uel station could be by the end of the next plan period

Even if the power is available, further industrial expansion, such as is envisaged in the construction of the fourth steel plant at Bokaro and the heavy machine building group of industries, will be seriously handicapped unless additional quantities of industrial water are also provided. The answer to this problem lies in the construction by the D V C of another storage dam across the Damodar river at Aiyar in the Ramgarh forest Preliminary investigations show that the Aiyar Dam could store about 1 5 million acre feet of water and generate up to 120 000 kws of power at a cost of roughly Rs 30 crores It would be prudent to sanction this project without delay so that detailed investigations can be initiated and work commenced as soon as the Panchet Hill dam and power house are completed within the next six to eight months In all large projects, the assembly of the necessary personnel and equipment and the building up of the requisite organisation are of very great importance It would, therefore, be both logical and economical to transfer the

DAMODAR VALLEY PROJECT

DAMS	TILAYA	KONAR	MAITHON	PANCHET HILL
Type & Length	Concrete — 1200 ft	Concrete — 900 ft Earth — 12030 ft	Concrete — 1188 ft Earth — 14523 ft	Concrete — 1215 ft Earth — 20940 ft
Height	99 feet	160 feet	162 feet	134 feet
Storage	451 000 acre ft	298 000 acre ft	1.2 million acre ft	1.4 million acre ft
Power (Installed)	6 000 kw	40 000 kw (proposed)	60 000 kw	40 000 kw
Cost	Rs 3.59 crores	Rs 9.75 crores	Rs 16 40 crores	Rs 17 92 crores

DURGAPUR BARRAGE

DURGAPUR BARRAGE	Length	— 2271 feet	
	Cost with canals	— Rs 22 91 crores	
BENEFITS	Flood Control	— 650 000 cusecs	
	Irrigation	— 1.04 million acres	
	Hydel Power	— 146 000 kw	
	Thermal Power	— Bokaro	— 225 000 kw
		— Durgapur	— 150 000 kw
		— Chandrapura	— 125 000 kw
		Ultimately	— 625 000 kw

organisation and equipment at Panchet Hill to the Aiyar Dam as soon as they are released from the former

The early construction of the Aiyar Dam is essential for another reason It was originally contemplated that the D V C should construct a series of seven storage dams on the Damodar and its tributaries—the Barakar, Konar and Bokaro—to contain a flood of a million cusecs which might occur once in a hundred years In view of the expenditure involved, however, it was decided to limit the programme in the first stage to the construction of four dams at Maithon, Panchet Hill, Konar and Tilaya and designed to pass a flood of 650 000 cusecs This was considered a safe initial limit as the previous record flood discharge observed was only of the order of 350,000 cusecs This flood, which occurred in 1943, devastated the countryside, washed away seven miles of the Grand Trunk Road and main line railway, isolated Calcutta and interrupted war supply movements It cost the country about Rs 35 crores in direct and indirect losses.

Last year, however, on September 15 and 16, the flood discharge observed at Durgapur was of the order of 660 000 cusecs or 10 000 cusecs more than the present designed capacity of the four D V C dams Disaster was averted only because 170,000 cusecs were arrested at Maithon while of the 470 000 cusec discharge observed at Panchet, only 180,000 cusecs were spilled over, the rest being absorbed to fill the new Panchet Hill reservoir The discharge below Durgapur was thus reduced to 205,000 cusecs as against a normal river capacity of 250,000 cusecs beyond this point

An uncontrolled flood of 660 000 cusecs would have caused tremendous havoc which would have cost not less than Rs 70 to Rs 80 crores if the 1943 toll were taken as an index On the other hand the four D V C dams have cost under Rs 50 to build (inclusive of power houses) The D V C can therefore legitimately claim that its dams have paid for themselves in a single season Flood control might be a negative asset but it is a very real one Imagine the difficulties if the Durgapur steel plant had been inundated!

That the D V C could control a flood above its designed capacity last year was a pure accident The Panchet lake happened to be empty It is now full like all the other reservoirs What if another flood of over 650 000 cusecs occurs this year or next? The D V C must augment its flood storage The Aiyar Dam will enable it to control a flood of up to 850,000 cusecs

The Aiyar Dam has many other merits It would provide industrial water to the Bokaro area and stabilise the supply of industrial water at Durgapur By reducing the flood gap'—storage below capacity in order to provide allowance for absorption of flood water—at Panchet Hill, the Aiyar Dam would facilitate the installation of another 40 000 kw unit at Panchet and enable it to provide storage for additional irrigation of 50,000 acres

It is necessary to press the case for the Aiyar Dam because it is vital to plan boldly and in good time Delay can cost the nation dear in flood damage and by slowing down the progress of industrialisation with all its attendant benefits

The D V C has more than industrial importance It is playing a role in agricultural development The canal system is nearing completion and about 1 1 million acres will come under irrigation The initial offtake

of water by the peasants was poor but two seasons of 'disproportionate ... ousand ... te peasants ... water

into their fields

Wet farming calls for altered crop patterns The D V C. has established a 200 acre farm below Durgapur to test crop patterns and provide a demonstration and extension centre

From June, the D V C will also be able to provide an 85-mile navigation channel from Durgapur to the Hooghly at a point 35 miles above Calcutta The main left bank canal, which has a discharge of 9,000 cusecs, *will be utilised for navigation* It will be able to take tugs and barges of *up to 250-300 tons* This will relieve the railways of coal traffic to *Calcutta*

The D V C has completed the first stage of its *development* A bigger role lies ahead.

MAITHON, *January 18, 1959*

BOOM TOWN

DURGAPUR is like *so many* other obscure villages in India that have overnight become booming industrial centres.

In the past year, the Durgapur Steel Plant has risen above the ground and the West Bengal Coke Oven Plant gone into production A large power station is being constructed. Mining equipment and optical glass plants are proposed to be set up in the area A.C C -Babcock-Vickers are to establish capacity for manufacturing cement equipment. It is proposed to locate the Central Mechanical Research Institute here and a new engineering college *is in the offing*

At the moment, however, Durgapur is primarily a steel city Although started two years after Rourkela and a year after Bhilai, Durgapur will probably market its finished products not much later than the other two plants. This is partly because ... ary site investigation had ... of the fact that the ... l experience in stee...

... factor has been the award of a package-deal contract to ISCON, a consortium of seven major British firms, for the design, survey, construction, procurement of equipment and erection of the entire plant Hindustan Steel has no responsibility for the actual plant at this stage It will take over a fully operating unit Certain ancillary works and the township are the only tasks with which it is directly concerned at present The entire project is being supervised by the International Construction Company, another British firm, who are the Government of India's steel consultants

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sarily always proof against design-faults and consequent 'teething troubles'. But there is no doubt that our young engineers and technicians have the necessary calibre to learn, adapt and improve designs and techniques What has held them back so far more than anything else has been the somewhat misplaced lack of confidence in them by their older technical superiors and the policy-makers in the administration.

But things are beginning to change Engineers at Durgapur have been able to suggest modifications in the blast furnace design, some of

Bokaro steel plant

"Dasturco's" report, which may be ready before the end of the year, will give the Government some idea relating to the plant site and layout, the possible range of products (based on a market survey of demand trends), raw material logistics, the metallurgical processes that might be adopted, cost of plant and operating costs The possibility of indigenous fabrication of certain portions of the plant might also be indicated On the basis of such a report, the Government will be in a position to take further decisions

"Dasturco" is a young firm manned by promising young men Two years ago it won a contract for the design and construction of a large ferro-manganese plant at Joda, in Orissa, against several foreign bidders ... Rs 35 lakhs lower than its nearest ... plete the job eight months ahead of ... selected Dasturco as their consul- ... the supervision of civil works that were to be done by them in Rourkela A change in Government's contract with Krupp-Demag, however, nullified this arrangement

The founder of the firm Dr M N D... s worked on the design ... United States, Latin ... puted firm of American ... team sent out to India ... Works' expansion pro- ... Minister for Commerce ... suggested to Dr Dastur that he should return to India and set up a consultancy service in this country A year later, "Dasturco" was formed. A new talent has been added in India's plans for steel

DURGAPUR, *January 19, 1959*

This arrangement has certain advantages It has assisted in speeding up the construction schedule But it also suffers from a major disadvantage *Indian engineers have far less opportunity for gaining experience in design and construction than their counterparts in Rourkela and more particularly at Bhilai* Bright young Indian graduate-engineers who have just returned after training in Britain and the United States and who are to operate the plant, find themselves with practically nothing to do at Durgapur They are anxious to work and learn The project authorities are aware of this problem and are trying to do something about it Some of these youngsters may be temporarily assigned to other plants

The first blast furnace and coke oven battery at Durgapur are likely to be commissioned in October By April, 1960 some of the melting shops will be ready The rolling mill is scheduled for completion by October, 1960 and the wheel and tyre shop by April, 1961 Durgapur's products will consist of heavy structurals, billets, light sections and wheels and tyres for the railways The other plants will manufacture another range of products

A million-ton steel plant, such as Durgapur, requires about a thousand engineers and several thousand skilled operatives to man it The operatives have been recruited from the open market and other firms, and have been trained at Jamshedpur, Burnpur, Sindri, the Bhadravati Steel Plant and elsewhere Of the engineers most of the senior men have come from the private sector, including Tata's and Indian Iron and Steel But these are relatively few in number The vast majority are young engineering 'graduate apprentices' who are being given in plant training abroad and started off on a Rs 250 850 grade (basic salary) The township accommodation is good and the facilities for medical attention and education very satisfactory

I asked a senior engineer why he had chosen to leave a highly salaried job in the private sector to join Hindustan Steel His reply was interesting He was looking for 'peace of mind', security and straight dealing All things considered, he did not believe that he would be worse off materially either The younger, more junior people are, however, probably better off than they would be in the private sector Both older and younger men displayed enthusiasm in being participants in a great adventure Another engineer come from the private sector, however, pointed out that production would suffer if he and his colleagues continued to be tied down to as much paper work as they were at present

Durgapur, like Rourkela and Bhilai, is capable of expansion to two million tons India needs more and more steel A two-million ton plant at Bokaro has been virtually decided upon and preliminary work on it has already begun Rourkela, Bhilai and Durgapur have cost the country over Rs 300 crores in foreign exchange on plant and equipment and another Rs 30 crores on foreign technical services This constitutes a very heavy drain on our external resources which must be eliminated as soon as possible Fortunately, steps are already being taken in this direction The heavy machine building group of industries to be located at Ranchi and Durgapur will, on completion provide capacity for the manufacture of equipment for a million ton steel plant every year

What about plant-design and consultancy services? This is a highly specialised field in which even experienced foreign experts are not neces-

early always proof against design-faults and consequent 'teething troubles'. But there is no doubt that our young engineers and technicians have the necessary calibre to learn, adapt and improve designs and techniques What has held them back so far more than anything else has been the somewhat misplaced lack of confidence in them by their older technical superiors and the policy-makers in the administration

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DURGAPUR, January 19, 1959



WHEELS OF PROGRESS

THE area around Chittaranjan is famous for roses Nowadays they also make locomotives here

The Chittaranjan Locomotive Works and TELCO, in Jamshedpur, supply the Railways with broad and metre gauge engines respectively They produce fine steam locomotives but will soon have to switch to the manufacture of electric or diesel engines if they are to keep pace with international trends and India's own transportation requirements They are thinking on these lines

Anyhow, for the moment, the indigenous production of steam locomotives constitutes a sound beginning The import content of the locomotives made in Chittaranjan and TELCO is today less than 10 per cent of their value This will be further reduced to a few thousand rupees and limited to about half-a dozen items as soon as the Rourkela and Durgapur steel plants begin supplying Chittaranjan with main bar frames and boiler plates of the requisite length and size as well as tyres and axles

Indigenous sources of supply have been developed for a large number of components, proprietary fittings and castings Large cradle castings which Chittaranjan previously imported are now being indigenously procured This has been achieved by breaking down the casting into 13 smaller parts for which indigenous capacity exists TELCO already has a large steel foundry and Chittaranjan is setting up similar capacity

As the output of locomotives has increased and the efficiency of the operatives improved, costs have come down in both plants The ex-works price of a Chittaranjan WG locomotive is today Rs 4 14 lakhs as compared with Rs 7 5 lakhs in the initial stages while the import content is about Rs 50 000 as compared to about Rs 1 8 lakhs at the end of the First Five-Year Plan By the end of the Second Plan, the WG loco will be an almost completely *swadeshi* product

Precision is an important factor in most modern industry In Chittaranjan and TELCO, there are tools of such delicacy that they have to be operated in specially air conditioned cabins Again, the welding of the boilers has to be perfect enough to pass an X-ray test

In Chittaranjan, scientific job rates have been fixed and a good worker can earn up to 40 to 50 per cent above the norm Chittaranjan operatives have achieved an efficiency ratio that compares very favourably with that of the North British Locomotive Company in the U.K The

TRANSPORT

	1956	1961 (Target)
STEAM LOCOMOTIVES		
Chittaranjan (broad gauge)	129	200
TELCO (metre gauge)	50	100
WAGONS	15 445	25 000 (installed capacity)
AUTOMOBILES		
Trucks	14 144	45 000
Cars	12 989	14 000
Jeeps and station wagons	5 005	6 000
Total	32,138	65,000

main difference lies in the higher fatigue allowance of 25 per cent given to the Indian worker as against 12 5 per cent to his British counterpart on account of climatic factors

Chittaranjan went into production the day the Constitution was inaugurated, on January 26 1950, and has in nine years produced about 900 locomotives Tata's took over the Government's Railway Workshop at Jamshedpur in 1945 to form TELCO but were only manufacturing road-rollers and boilers until the locomotive shops were completed in 1951 Since then TELCO has expanded by leaps and bounds It now has a modern, well-equipped automobile plant, with Daimler-Benz as associates, and an alloy-iron foundry

TELCO has at present a capacity of 7,200 units per annum in its automobile division and the sturdy Tata-Mercedes diesel truck and bus is found on the road all over the country In terms of value, about 50 per cent of the vehicle is indigenous, but this will rise to 87 per cent in value (and 90 per cent in terms of [illegible] by October when the [illegible] 59, the import content [illegible] require special steel, glass, some steering components and parts of the starting equipment

What about cost? The economics of modern automobile manufacture is geared to mass production Daimler Benz [illegible] have an [illegible] r parts and [illegible] advantage [illegible] hich can be [illegible] he requisite [illegible] single roof [illegible] reason that [illegible] expensive at least in the initial stages Special skills have also to be developed though here, as in other spheres, the Indian worker has shown that he is made of excellent stuff The efficiency of operatives in TELCO s automobile division as compared with Daimler Benz has been steadily rising and is now 1 1 4.

The cost of production will probably come down when TELCO attains an output of 12,000 units per annum by the end of 1960

Since TELCO produces both locomotives and automobiles, the overheads have naturally to be divided between the two This has been done on accounting principles on the basis of a formula worked out by the Railway Board

Transport and power are parents of industry Chittaranjan and TELCO have proved devoted nursemaids

CHITTARANJAN, *January 20, 1959*

THE FORGOTTEN LAND

BALEK is a small village near Pasighat in the Siang Frontier Division of the North-East Frontier Agency The people are Minyongs Visitors here, as elsewhere, are entertained of an evening by the villagers with "apong' (rice beer) served in bamboo stems and 'ponnung" a dance performed round a campfire by the local belles led by a 'miri' or priest who chants and beats time with a drawn sword But before this the guests are first conducted to the 'moshup' or men's dormitory Here, seated round a central hearth and sipping 'apong," it is customary for one of the village elders to welcome the guests Much of the speech, however, may be devoted to the problems of the tribe A representative of the administration, if present, usually replies

On the evening I visited Balek, in the company of a party of press correspondents, the tenor of the welcome address was sharply critical of the Government. But there was no malice It was spoken in Assamese and translated by the speaker himself into Hindi The Minyongs, as *some other tribal people, are great orators They are democratic and believe in plain speaking*

The complaints that evening were manifold There were not enough schools and hospitals Medicines were lacking T B was on the increase The road to Dibrugarh was not yet complete Labour was being imported from the plains and not enough local people were being employed The Assistant Political Officer, Pasighat, and the Deputy Adviser for N E F A replied after which everyone adjourned outside in great good humour for more "apong" and the "ponnung ' Officials and journalists alike were soon dragged into the dance

The experience at Balek is typical of N E F A The very fact that there is this persistent cry for roads schools and medicines is the best proof that the tribal people are awake and on the march and recognise the benefits of administration It is the introduction of roads schools and hospitals in N E F A and the commencement of other development works that has aroused the consciousness of the people Now they want more of everything and speedily too

Everyone knows of the North-West Frontier It was a name that conjured up images of proud warlike tribes and sudden death India lost the North West Frontier with partition but found it had inherited a new frontier, equally wild equally strategic, perhaps more romantic certainly more mysterious and less known—the North East Frontier When the British left India in 1947 this was a frontier that merely existed on maps It had never been reached The effective administrative frontier lay on the so-called "Inner-Line' along the fringe of the mountains crowding in on the Brahmaputra valley, in Upper Assam, in a giant horse-shoe

The unrestricted movement which existed between Assam and the tribal areas frequently resulted in disputes and disturbances Consequently power was taken under the Inner-Line Regulation of 1873 to prohibit British subjects from going beyond a specified limit without obtaining a special licence from the Deputy Commissioner But the political frontier of India ran well beyond this line In between these administrative and political frontiers lay a *vast unexplored territory comprising* what was officially described as the 'totally excluded areas" The Khasi

Jaintia and Lushai Hills and part of the Naga Hills were however brought under the administration for reasons of economic or military necessity such as the opening of the tea gardens, the Burma wars and tribal raids into the plains These constituted the "partially excluded areas".

The Japanese invasion of India through the Naga Hills was the first step towards ending the exclusiveness of the "excluded areas" The Chinese occupation of Tibet ... ng the MacMahon line with very ... at the same time the enactment c ... Govern- ment to extending the rig ... to the farthest corners of the Ur ... rontier Agency came to be established. The Sixth Schedule of the Constitution provides that "the administration (of this area) . shall be carried on by the President through the Governor of Assam as his Agent" The Governor is assisted by an *Adviser*, a senior civilian.

N.E.F.A. comprises an area of about 33 000 square miles inhabited by some 800 000 people It is divided into six administrative zones, namely, the Kameng Subansiri, Lohit, Siang, Tirap, and Tuensang Frontier Divisions each under a Political Officer The administration has been pushed out to the international frontier The few remaining unexplored areas are being surveyed. The Indian flag flies over a once-forgotten land It is respected on both sides of the border.

There are in N E.F.A. at least 20 main tribes and numerous lesser tribes, each distinctive in some way or other In Kameng live the Mompas Akas and Dafla ... Miris, Tagins and Apa T ... (collectively known as A ... n Tirap the Nokteys, T ... gas, a generic term in- c ... tribes each with its own language and dress.

Tribes who have always lived their own lives and never known outsiders might naturally resent what would at first sight appear to be an alien administration come to take away their land and liberty, destroy their way of life and impose other ways upon them The Government has however been able to win their affection and loyalty The policy has been to protect the people from unregulated external pressure on the one hand and assist them to develop on the lines of their own genius on the other Only such customs as are clearly obnoxious, unhealthy or destructive, such as head hunting, opium eating and jhum (shifting) cultivation, have been sought to be ended or changed

Change has begun. But here again, there is need for caution. For some time N E F.A. may have to adopt a closed economic system as the unregulated entry of the industrialist and the "bania" from the plains could easily lead to the exploitation of these simple tribal people It would be a tragedy if "civilisation" meant the *dhoti* and *sari* in place of the very attractive costumes the people wear Most tribes have a high standard of weaving and an excellent sense of colour The import of mill cloth into the area was recently completely banned as soon as it became evident that cheap prints presented a real economic and cultural threat At the same time, the introduction of improved yarn, better looms, carpentry, terraced cultivation, better seeds, new crops, schools hospitals, a protected water supply and roads will not destroy the tribal structure.

The complaints heard at Balek are heartening symptoms of change from within. Far from imposing anything on the people the charge is that the administration is not doing enough. A few years ago, doctors had to compete with tribal medicine-men. Today they co-operate. The doctor operates on his patient or gives him modern prescriptions The local priest might in addition sacrifice a chicken and examine its liver for omens regarding the patient's recovery. The people want more doctors and more hospitals.

The development of the area itself creates a number of economic and political problems At present the tribal economy is simple Payment is even now almost entirely by barter or in kind—mithun (bison), salt, bells, shells (I saw coins on only two occasions. A Minyong girl was wearing a charming necklace of silver Indian rupees At Ziro I noticed a silver Tibetan coin on a bracelet). Production is limited to family requirements (e g. weaving) or village needs Inter-village and inter-tribal trade was formerly limited on account of insecurity and lack of communications, the latter itself the product, in part, of the former. The wage system does not operate

The spirit of co-operation is quite strongly rooted in some of the tribes Among certain Nagas, whole villages are divided into age-groups, including both men and women, and each is allotted certain tasks which are then collectively performed This provides a basis for spreading the co-operative ideal and pursuing developmental policies with the assistance of the people Such co-operation has been forthcoming and many jeep and mule tracks have been built through popular effort at half the cost that would have had to be incurred if contract labour were employed. Villages which come forward in this manner are placed at the top of the administration's list for the opening of schools or hospitals

Politically the problem is to foster administrative patterns suited to N E F.A and administer the area through the people At the moment there is what is known as the single line administration with the Political Officer responsible for every aspect of governance and development in each division The Political Officer is assisted by a technical staff of doctors, engineers and others Assistant Political Officers are located in the [illegible]

vest authority in certain individuals—and this led to petty tyrannies and jealousies—the policy now is to vest responsibility, to the extent possible, in the collective leadership of the 'Gam Budas' (village elders), Kabengs (tribal councils) and similar institutions

The N E.F.A administration is the only civil administration in the world [illegible] dependent on air supply Six th [illegible] over 40 dropping zones throug[illegible] tea and medicines There are only four Dakota landing strips and none of them up to international standards Flying over the mountains through rain and cloud is not easy But the Air Force and the base organisation, the Directorate of Supply and Transport, do the job

fact that
regard-
There
rea and
another A beginning has been made here with the establishment of a Research Department under the guidance of the well-known anthropologist, Dr Verrier Elwin, who has been appointed Tribal Adviser to N.E.F.A.

A considerable mass of literature has already been collected on tribal religion. Like primitive religions elsewhere, the tribal religions of N.E.F.A. recognise a supreme being They profess a belief in an after-life
is wrapped up in ritual Such
, which was probably related
The effort is to develop the
requirements of the more ad-
en to any tribal person freely
he or she so desires. But the
gan savage *en masse* has been
eliminated

Take language There are about 60 dialects spoken in N.E.F.A. Here again, a newly-created department of philology is attempting to group related dialects and evolve about half a dozen "basic languages" It may be possible to develop a basic Adi (Abor) language A common near-Tibetan language could be evolved for the Buddhist tribes in the Kameng division A common language might again be possible in the Tirap division It would be necessary to write
develop these languages Except
a script of its own. The Nagas h
script It is proposed to introdu
script for all the tribal
languages

At present
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ate Hindi is
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is becoming
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s the lingua
"Joy (Jai) Hind
all over N.E.F.A. today is a lusty

PASIGHAT, *February 1956*

* Since this article was written the Tuensang Division has been merged with the Naga Hills District of Assam to unite the Naga homelands under a single administration. A Frontier Administrative Service has been constituted and the air supply operations have been taken over by the Indian Airlines Corporation.

MAPPING MINERALS

PERHAPS not all geologists have to contend with tigers Some do I met one of the latter category at the Geological Survey of India He was making a 'one inch to a mile' map in the jungles of Mayurbhanj in Orissa some years ago when chased by a tiger. 'What did you do," I asked "I ran like hell' he replied with a smile, adding "It's very interesting work, you know "

The Geological Survey of India has at present about 50 men engaged in compiling a one inch to one mile geological map of the country It is hoped to double this staff and, with luck, complete the task in 20 years. Only a fifth of the country has been mapped on this scale so far, the earlier maps being of smaller scales of an inch to eight miles or perhaps an inch to four miles excepting in well-developed mineral regions such as the Jharia-Raniganj coal belt

In the words of the G S I, "the appraisal and development of the mineral resources of any country is dependent on the availability of a complete and accurate geological map, and such a map is the basis on which all other geological work rests" The minimum scale on which such mapping should be undertaken—if tigers permit—is one inch to one mile

How is a geological map compiled? The Survey of India provides the base physical map of the area to be covered on which the geologist then superimposes a geological map Armed with a 'clino-compass' (an *instrument for measuring the slope of beds with reference to the horizontal*), a lens and a hammer, he walks over the ground, usually along river-beds or valleys, looking for geological clues The surface rocks he sees or uncovers by shallow digging give him an idea of the strata He then studies the 'attitude' of the rocks and interprets the geology of the area on his map, marking his predictions of the sub-surface formations with different colours and symbols On an average, a geologist may be able to cover about 250 square miles in a season of six months He devotes the rest of the year to filling in his map Once the map is ready and the geologist has located areas of mineral interest he has to resort to geophysical methods of electric gravity and magnetic survey or geochemical techniques—sampling minerals found on the surface or at shallow depths *and estimating the possible concentration of these minerals at lower levels* —in order to narrow down the area of actual prospecting for minerals It is on the data thus provided that drilling is next undertaken in order to confirm the existence of mineral deposits

The work of the G S I normally ends here and the preliminary steps towards opening up the mines is left to the Indian Bureau of Mines The commercial exploitation of whatever mineral deposits have been located and proved constitutes the final stage

The efforts of the G S I in recent years have added greatly to our knowledge of the mineral wealth of the country A lot more metallurgical coal has been discovered than was earlier anticipated A new coal seam has been found in the Mirzapur district of U P and drilling is about to commence at Sangrauli. Investigation of our iron resources has established the existence of 15 000 million tons of ore in Bastar (Dandakaranya) and 130 million tons of high grade ore at Sandur, in Bellary

District. Larger reserves of manganese, copper, gold and pyrites have been proved Important limestone deposits have been discovered A general reconnaissance survey has proved the total reserves of all grades of bauxite at not less than 250 million tons of which a tenth part would be high-grade ore A base metal unit has been formed and the search for non ferrous metals, of which there is a grave shortage, is to be intensified.

The work of the G S I is, however, not limited to minerals The ... to the tubewell

If the G S I tells us what quantities and grades of minerals ... have, the National Metallurgical Laboratory at Jamshedpur is concerned with their utilisation to the best possible advantage of the nation The ... able attention to the problem

... import) and of nickel free coinage alloys may be cited.

The N M L. has been able to establish another process for making aluminised steel which can replace galvanised steel in a variety of industrial uses This process is helpful insofar as aluminium ores are found more abundantly than zinc Efforts are being made to produce tinless bronze

Perhaps the most interesting aspect of the work of the N M L lies in the semi-commercial size low-shaft furnace it has set up This pilot plant costs Rs 30 lakhs and has a capacity of 15 tons per day

The low-shaft furnace, as opposed to the conventional type of blast furnace, has been developed in Germany The attractive feature about it is that unlike the conventional (high shaft) blast furnace, the low shaft furnace can use non-metallurgical coal and even lignite and low grade iron ore (with an iron content of not less than 30 per cent) in the production of pig-iron The maximum capacity for which a low-shaft furnace has been successfully designed so far is 100 tons per day as compared with 1 000 to 2,000 tons per day and more in respect of the conventional blast furnace The capital cost of a low-shaft furnace may be up to 50 per cent less than that of an ordinary blast furnace, but its operating cost is much higher on account of its greater manpower requirements For this reason, even the Germans have found the low-shaft furnace economical only for the manufacture of pig iron (on a modest scale) and not *for steel-making*

Nonetheless, in Indian conditions, the low-shaft furnace, if proved, would be invaluable in providing pig-iron for small foundries scattered all over the country There are iron ore deposits in Madras, Mysore and Rajasthan which could be the basis for a pig iron industry in these States provided low grade coal or lignite could be utilised in low-

shaft furnaces. The N.M.L. pilot project will prove whether this is going to be possible and economic. The results will be of considerable significance.

JAMSHEDPUR, *January 22, 1959.*

BRINGING INDIA CLOSER

BONDAMUNDA was until recently a little village four miles east of Rourkela, itself another village astride the South Eastern Railway on the main Howrah-Bombay line. A steel plant is now being built at Rourkela and Bondamunda has become an important junction with a huge marshalling yard that will ultimately have 60 parallel lines carrying a flow of coal and ore into the Rourkela plant and finished steel out of it.

When work was started at Bondamunda two years ago, the contractors were threatened by irate Munda tribesmen armed with bows and arrows, demanding compensation for the lands acquired from them by the Railways. Peace has been restored and Bondamunda is today a great knot of gleaming rails on the newly doubled track from Tatanagar to Drug, near Bhilai. This is the Steel Railway.

The steel development programme has placed a heavy load on the Railways. Millions of tons of additional traffic have to be moved. On the more congested Eastern Railway that serves Durgapur and the D.V.C. industrial belt, 2,400 track miles are being electrified from Howrah to Mughal Sarai and Asansol to Rourkela This is no small undertaking and will increase line capacity by about 50 per cent The Railways will need 200,000 kilowatts of power on these routes and over 350 electric locomotives are being ordered from abroad

The steel plants need iron ore and coal much of which is being procured from new sources Bhilai will get some of its coal from the Korba fields near Bilaspur and its ore from Rajhara, 60 miles south of it The South-Eastern Railway has had to construct new lines to both these places. It is also building another new line, 42 miles in length, from Bondamunda to Barsua from where Rourkela will get its iron ore

The survey for the Bondamunda-Barsua line was ordered early in 1956. The survey was completed six months later and tenders were invited for the earth-work, bridges, stations and all other work excluding the actual laying of the permanent way which is being done departmentally by the Railways Work commenced early in 1957 The alignment has been completed and thirteen miles of track have already been laid

The Bondamunda-Barsua line passes through picturesque, undulating country. Panther and bear abound in the sal and *mahua* forests and there are herds of elephant in the thicker jungles in the red hills of solid iron above Barsua.

The tribal people are friendly and curious The trolleys that ply on the 13 miles of line already constructed are a constant source of wonder to these innocent people. The railway work-gangs, for their part, find the

tribal sport of cock fighting equally intriguing Birds of the same build and weight are matched Betting is brisk. Each cock has a metal blade attached to one of its legs and is trained to cut down its opponent A cock that turns its back on its adversary is instantly disqualified

The new line passes through difficult terrain involving numerous ... ments and as many as 108 ... lges The contractors use ... rce has touched a peak of ... of the area render working conditions difficult Progress has, however, been according to schedule and September is the target date for completion

... to perr ... In the ... quate crossing points, the line capacity will be 12 trains daily in each direction The maximum permitted speed will be 60 m.p h (after consolidation of the track) but the gradient will limit this by a third

The line is estimated to cost Rs 7 crores including about Rs 20 lakhs as compensation for land and timber standing on it This works out to about Rs. 15 lakhs per track mile The telegraph and telephone lines being laid alongside are being financed by the Posts and Telegraph Department.

The Bondamunda-Barsua line terminates at the foot of an ore hill which rises 1 300 feet above the valley The ore will be excavated at an elevation of 2 700 feet by mechanical shovels and passed through a crushing plant before being fed on to a conveyor belt going down into the valley The ore will be screened here and then carried on another conveyor belt to the wagon load ... tons of ore will be moved to ... will cater to an output of a m...

Barsua is the beginning of a chain of iron hills that run south-east for many miles To the south ...

... Iron and Steel ... mines

Hindustan Steel has acquired 14 miles of hill above Barsua, at Tensa The ore covers the hilltop to a depth of about 150 feet To begin with only the first four miles will be worked This little patch of hill alone is estimated to contain 112 million tons of rich iron ore A small mining township is growing up at Tensa A water storage tank has been

RAILWAYS

	1956	1961 (Target)
Route mileage	34,182	Additional 842 miles of new line and 1607 miles of doubling
Electrified mileage	240	Additional 1442 miles of which 882 miles will be completed
Freight carried	114 million tons	162 million tons

Second Plan provision for Railways — Rs. 1125 crores
Foreign exchange component — Rs. 375 crores

built near the labour lines and two wild elephants were among the first to use this amenity so thoughtfully provided by Hindustan Steel

Another new line runs south from Bhilai to an ore-hill at Rajhara. Beyond Rajhara lies Dandakaranya. In a few years, the railway will bite through the iron range to this new land. The Railways serve industry They also bring India closer

ROURKELA, *January 23, 1959*

A DREAM COME TRUE

A LITTLE over a year ago, the Prime Minister, Mr Nehru, visited the Bhilai Steel plant and, on leaving wrote in the visitor's book ' What was once a dream begins to take shape and come true—(Bhilai is) a symbol and a portent of the India of the future ' The dream has been realised

Production of pig iron will commence at Rourkela on Republic Day and it is expected that the President will inaugurate the tapping of pig iron from Blast Furnace Number One at Bhilai on February 4 The Durgapur plant is scheduled to start producing pig iron in October while Rourkela and Bhilai will be marketing finished steel by the end of the year Meanwhile the expansion programmes of Tata's and Indian Iron and Steel have been completed and their new plants are being run-in Within two years, the Plan target of 4 5 million tons of finished steel per annum will have been attained

The Second Five-Year Plan has largely turned on the steel programme Investment in steel in the public and private sectors together with the related outlay on mining and power and railway development, has probably cost the country something of the order of Rs 1 000 crores roughly half of which would be in foreign exchange After years of anxious waiting, this huge investment has begun to pay off The inauguration of production at Rourkela and Bhilai should boost the nation's morale tremendously

The men at Rourkela and Bhilai are tense and excited So are the German and Soviet engineers who have assisted in the construction of these plants Even yesterday, engineers and painters were fussing around the cold shell of Blast Furnace Number One at Rourkela barely 24 hours before it was to be blown in There is evidence of the same bustle at Bhilai Three years ago Rourkela was a jungle and Bhilai a patch of cultivation

Iron-making was a well known skill in ancient India and the iron pillar near the Qutab Minar in Delhi bears ample testimony to this fact The pillar is believed to weigh about six tons and its origin is dated back to 300 A.D Subsequently, the iron and steel industry like many others languished and decayed Sixteen hundred years later, the industry was born anew The Barakar Iron Works started in 1874, had a chequered career until it was absorbed into the Indian Iron and Steel Company in

1936 A more enduring foundation to iron and steel manufacture in the country was however, given later by Jamshedji Tata. The first blast furnace at Jamshedpur was blown in in December 1911

Many of the engineers and skilled operatives who inaugurate production in the three new steel plants will have come from or will have been trained at Tata s or Indian Iron and Steel Some of these men have been sent abroad for short courses The younger graduate-engineers have just returned from the Soviet Union Germany, the United Kingdom and the United States after 12 to 15 months of in plant training Among this category enthusiasm makes up for inexperience But these boys are anxious and willing to work and learn and will have a key role to play in training those who come after them.

At Rourkela the contracts for supply and erection of plant are distributed among 32 German firms An Indian project officer has been associated with the erection of each shop and Indian engineers have had some opportunity of assisting their German counterparts In Bhilai, the

roughgoing The

s with Hindustan

stage by Indians

direction and guidance of Soviet experts who are, in turn responsible for ensuring the necessary technical perfection This arrangement has worked well and has given the Indian engineers a valuable insight into the plant that they are going to operate It must however be noted that such an arrangement could not have been extended to a second plant on account of shortage of (Indian) personnel.

Now that the three new steel plants are entering the phase of producion it is more than ever necessary that responsibility be decentralised and red tape and paper work reduced to the barest minimum. The steel plants are commercial enterprises and not departments of the administration. Business principles rather than secretariat codes must apply The procedures for financial sanction and procurement of supplies must be simple and speedy The General Manager must be vested with sufficient

STEEL PLANTS

PUBLIC SECTOR	Rourkela	Bhilai	Durgapur
Capacity (Ingots)	1 million tons	1 million tons	1 million tons
Finished steel	720 000 tons	770 000 tons	790 000 tons
Pig Iron	——	300 000 tons	350 000 tons
Cost of Plant	Rs 170 crores	Rs 131 crores	Rs 138 crores
Cost of township & ancillaries	Rs 44 crores	Rs 43 crores	Rs 27 crores
Foreign Exchange component	Rs 133 crores	Rs. 95 crores	Rs. 95 crores
Foreign collaboration	German	Soviet	British
Completion	1960-61	1960	July 1961
Overall cost of Plants	—Rs 559 crores		
Personnel required			
Engineers	—about 2 000		
Operatives & skilled workers	—about 19 000		

PRIVATE SECTOR	Ingot Capacity	Finished Steel	Pig Iron
Tata Iron & Steel	2 million tons	1.5 million tons	——
Indian Iron & Steel	1 million tons	800 000 tons	400 000 tons
Mysore Iron & Steel Works	——	100 000 tons	——
OVERALL CAPACITY by 1961 —			
Ingot Steel	—6 million tons		
Finished Steel	—4 68 million tons		
Pig Iron	—1.03 million tons		

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The Second Five-Year Plan has largely turned on the steel programme. Investment in steel in the public and private sectors, together with the related outlay on mining and power and railway development, has probably cost the country something of the order of Rs. 1,000 crores, roughly half of which would be in foreign exchange. After years of anxious waiting, this huge investment has begun to pay off. The inauguration of production at Rourkela and Bhilai should boost the nation's morale tremendously.

The men at Rourkela and Bhilai are tense and excited. So are the German and Soviet engineers who have assisted in the construction of these plants. Even yesterday, engineers and painters were fussing around the cold shell of Blast Furnace Number One at Rourkela barely 24 hours before it was to be blown in. There is evidence of the same bustle at Bhilai. Three years ago, Rourkela was a jungle and Bhilai a patch of cultivation.

Iron-making was a well-known skill in ancient India and the iron pillar near the Qutab Minar in Delhi bears ample testimony to this fact. The pillar is believed to weigh about six tons and its origin is dated back to 300 A.D. Subsequently, the iron and steel industry, like many others, languished and decayed. Sixteen hundred years later, the industry was born anew. The Barakar Iron Works, started in 1874, had a chequered career until it was absorbed into the Indian Iron and Steel Company in

between the Mahanadi and the Godavari and is drained by the many tributaries of these two rivers The country is undulating and the main plateau is from 1,500 to 2 500 feet high The land can be irrigated and numerous small and medium schemes are under investigation The hydro-electric p [illegible] n kilowatts [illegible] d in the ar [illegible] graphite, [illegible] ous other minerals

The development of this area has been entrusted to an autonomous [illegible] persons.

Of the nine million displaced persons who migrated to India after partition, 4 2 million came from East Pakistan. Not all of the latter have been rehabilitated Outside Sealdah Station Calcutta, I saw something a few days ago that made me ashamed Hundreds of ghastly hovels crowded the precincts of the railway terminus The lost look of helplessness and hopelessness on the faces of those refugees was something terrible

Over 200 000 other displaced persons are still living in camps all over West Bengal. The Central Government has been spending about Rs 10 crores a year in maintaining these camps Tented accommodation is provided. Each family gets a weekly dole Education and medical attention are free Clothes and blankets are distributed There are special maternity and diet allowances *Life is miserable*

I visited the Bagjola camp just outside Calcutta It has 9 000 inmates, mostly agriculturists, scattered over 11 sites Most of the refugees here came to the camp in 1954 and 1955 I spoke to some of the men Yes, they said, they had heard of Dandakaranya Some people had come and told them about it But a lot of others had visited them just outside the premises of the camp and told them that they should not go A young man of about 20 a strong healthy fellow, a bachelor with no family responsibilities, arrogantly said that he would rather *die in* Bengal than be

DISPLACED PERSONS

Refugees from West Pakistan	— 4 8 million
Refugees from East Pakistan	— 4.2 million
EASTERN ZONE	
Population in Camps Homes and Infirmaries	— 280 000
Persons given rehabilitation assistance	— 2.72 million
Persons who have not received assistance	— 1.20 million
DANDAKARANYA	
Location	— Bastar Koraput and Kalahandi Districts
Area	— Initially — 30 000 square miles Ultimately — 80 000 square miles
Population	— 3 05 million
Tribal population	— 45 per cent
Resources	— Rich forests (teak sal bamboo) Hydro-potential of 2.5 million kw *Minerals* (Iron ore manganese bauxite limestone graphite and clays Also copper monazite mica and asbestos)
Agency	— Dandakaranya Development Authority

authority to run the plant from day to day. The status and functions of Hindustan Steel, the parent company, must also be clearly defined. There must be no attempt to run these plants from Delhi.

No thought has yet been given to the question of production bonuses. Production, of course, is [illegible] ne time will elapse before the normal, rated [illegible] ndustry, however, lends itself to increased [illegible] effort. A blast furnace with a daily capacity of 1,000 tons, such as has been installed, is capable of producing 1,100 or 1,200 tons per day. (The proposed addition of sinter, a combination of iron-fines, flue dust and mill scales, can further increase output by 10 to 15 per cent and more). But incentives are necessary to produce these results In any event, production bonuses are being paid by the two private producers and Hindustan Steel will presumably have to follow suit.

All the three new plants have been designed for expansion to between two and three million tons and this capacity can be achieved with relatively small additional investments This, however, is for the future For the present, it is a matter of great satisfaction that after years of labour and gestation the 'core' of the Plan should begin to find fulfilment.

BHILAI, *January 24, 1959.*

A NEW FRONTIER

MANY centuries ago, the Ramayana tells us, Rama and Sita spent 14 long years in the forests of Dandakaranya They were exiles from home Dandakaranya has perhaps not changed very much in a thousand years It remains a land of forests, though forests of great beauty and richness, sparsely inhabited by a variety of aboriginal people who subsist in very primitive conditions.

For a thousand years, Dandakaranya has been a remote and neglected land. But no more. The jungle is to be reclaimed, the land developed, the rivers harnessed for irrigation and power, the minerals exploited and new colonies built for displaced persons from East Pakistan and landless *adivasis.* The refugees are exiles from home, the *adivasis* exiles from society, condemned to live in direst poverty and neglect For both Dandakaranya will provide a new home and a new opportunity.

Where is Dandakaranya? It encompasses 30,000 square miles of territory in the heart of India comprising the Bastar district of Madhya Pradesh and the Koraput and Kalahandi districts of Orissa The adjacent Agency tracts of Andhra and certain adjoining territories of Orissa and Madhya Pradesh may also be taken up for development later to extend the total coverage to about 80,000 square miles

The Dandakaranya of today has a population of barely three millions About half the people are tribal and more than half the area under forest. The forests contain rich timber. sal and teak. The territory lies

gaon—loans for the purchase of bullocks and a maintenance allowance until the first harvest As far as possible, the consumer stores, transport system and brick and tile kilns will be run on a co-operative basis.

The Dandakaranya project is as much for the uplift of the *adivasis* as for the resettlement of the refugees They will be given 25 per cent of
be settled in model colonies
The forests will be develop-
skills at the technical train-
employment in the wood-
working centres that are to be established to exploit the timber felled in the course of the reclamation operations

At present the difficulty is that the simple *adivasi* has very few wants and these are easily satisfied. He has no incentive for sustained work. An additional money income has no meaning for him. Anthropologists are busy studying how to overcome this hurdle and also the problems that might arise from the sudden exposure of tribal society to intensive outside influence The rights and privileges of the *adivasi* have not been forgotten Indeed, the Dandakaranya project will have failed in human terms if it does not bring the *adivasi* into active partnership in its programmes of development for prosperity.

Two factors more than any other are responsible for the present backwardness of Dandakaranya malaria and lack of communications Anti-malaria operations are in full swing and malaria is fast disappearing At Pharasgaon, the offering of paludrine pills to visitors is still among the highest forms of courtesy The construction of roads and,
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PHARASGAON, *January 26, 1959*

resettled outside Some others echoed him I inquired how they proposed to live Quick came the reply 'There is land in Bengal and if we don't get land, we'll work.' That is what the Leftist parties have told them and these poor people have been duped They have been waiting for land and looking for work in Bengal for five year There is none Many have died in Bengal This is a great human tragedy for which the Communists and certain other Leftist parties must take their share of blame The refugees have proved useful political material which they have exploited Every displaced person resettled outside West Bengal means one vote less for them

There are others, too, who are interested in keeping the refugees in the camps, miserable as they are The Rs 10 crores annually spent on these camps by the Government of India is Rs 10 crores of income to thousands of contractors, suppliers, traders and others and even to some political parties The annual expenditure on tents alone is between Rs 75 lakhs and Rs 1 crore I gather that the salary bill of the West Bengal Government's Department of Rehabilitation is something of the order of Rs 1 5 crores Many people and various interests stand to lose if the problem of rehabilitation is solved in Bengal

And yet, can the nation spend Rs 10 crores every year on doles that are totally unproductive and which only perpetuate the misery and sap the morale of these unfortunate refugees? The answer is obviously 'No' It has been decided to close the camps by the end of June Those who are willing will be given work or land The rest will be given six months' dole and left to fend for themselves thereafter Under the pressure of circumstances many misguided displaced persons will prefer to migrate, hard though the choice may be They will, however, not be compelled to go

The West Bengal Government may be able to resettle about 10,000 families within the State maybe in the Sunderbans and Midnapore The remaining 30 000 families will be offered a home in Dandakaranya The first batch of refugees should be ready to move sometime next month. Dandakaranya is a rich land, but it needs many more people for its development

Pharasgaon, 125 miles from Raipur in Bastar District, will be the pioneer reclamation centre Units of the Central Tractor Organisation have gone into action to reclaim 1,400 acres out of the 7 000 acres of forest that will constitute the Pharasgaon Reclamation Zone Four other zones are also to be taken up for immediate development at Narainpur, in Bastar, and Amraoti, Umarkote and Malkangiri in Koraput District

Much development will have to be done by the be moved to work-site camps and will ha rigation barrages, canals and workshops They will have to do carpentry ply trucks, bake tiles and bricks, run stores and do a hundred other things They will have to work hard and patiently to rehabilitate themselves But the rewards will be correspondingly great The progress of the project will be measured by their efforts If they fail, the opportunities of Dandakaranya will be offered to others

Each refugee family will be given about seven acres of land, two to three acres irrigated and the rest unirrigated. They will also be given a brick and thatch hut—104 twin-units have already been built at Pharas-

gaon—loans for the purchase of bullocks and a maintenance allowance until the first harvest. As far as possible, the consumer stores, transport system and brick and tile kilns will be run on a co-operative basis

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Two factors more than any other are responsible for the present backwardness of Dandakaranya malaria and lack of communications Anti-malaria operations are in full swing and malaria is fast disappearing At Pharasgaon, the offering of paludrine pills to visitors is still among the highest forms of courtesy The construction of roads and, subsequently, of a railway from Rajhara (the iron ore mine south of Bhilai) to Visakhapatnam will have to receive top priority The Bailadila iron ore deposits in South Bastar could be mined for export if transport [illegible] -ened up, there will be a rush of [illegible] -urces Within ten years, there

[illegible] Dandakaranya [illegible] Its scope includes all [illegible] -ation, resettlement, tribal [illegible] -gation and power develop- [illegible] All this activity will call [illegible] s what the Dandakaranya [illegible] at present It is fortunate [illegible] Chief Administrator, Mr A. L. Fletcher, an experienced I C S officer of tireless energy and enthusiasm. The rest of the team is being slowly assembled—doctors, engineers soil experts, geologists, agronomists, anthropol- [illegible] others The calibre of these [illegible] are yet willing to leave the [illegible] for the rough and tumble of Dandakaranya The West Bengal Government has promised men who have not yet materialised. But those who do not come will have missed a great adventure For Dandakaranya is a challenge and an opportunity, one of the greatest since Independence

PHARASGAON, *January 26, 1959*

CHILDREN OF THE FOREST

THERE is a belt that runs the entire length of middle India which is predominantly *adivasi*. Bastar lies within this belt and Jagdalpur, its capital, now a district headquarters, is in the heart of Dandakaranya.

Bastar has a population of little under a million of which about 70 per cent. is *adivasi*. The *adivasis* are divided into some nine major tribes each with its own distinctive customs and language. Halbi, the *lingua franca* of the area, contains a 40 per cent. admixture of Marathi. The other dialects have been influenced by Telegu, Oriya and even Bengali.

The *adivasis* of Bastar are essentially forest tribes. Around Narainpur, which will form one of the reclamation zones under the Dandakaranya project, the people are mostly Muria Gonds. Like all the other *adivasis* they are a simple, honest, carefree people, hospitable and innately artistic.

The Murias, again like most of the other tribes, live in small villages scattered through the forest. They have given up shifting cultivation—still practised by certain tribes in the more backward hill areas—and cultivate settled tracts. Their agriculture is primitive. The land is ploughed by hand and the seeds broadcast. Yields are pitiably low. Rice is grown. Mustard is the only cash crop. Eighteen per cent. of the tribal population in Bastar is landless, but among the Murias this proportion is higher.

The villagers are desperately poor and the average diet of most of the *adivasis* is below subsistence levels. Malnutrition is universal. The diet is unbalanced, being almost wholly of starch. Lack of food and clothing are responsible for most of the current diseases. Skin troubles are common. Among many of the tribes, the normal diet is supplemented by forest products. Often, forest herbs and roots and tamarind gruel constitute the sole diet for three or four months in the year. The *adivasis* hunt and indiscriminately destroy game for food. Rats are especially relished and the *adivasis* have been known to spend a whole day hunting a single rat and even trample their fields to ruin in the process.

Although the forests are rich, fodder supplies are scanty. No milk is drunk. Cattle are used as draught animals and for sacrifice. The *adivasis* are nature worshippers. They have their own priests and witch doctors but no gruesome rituals. Drink, song and dance are their pastime and it is in their music and dance, their jewellery and dance costumes that their artistry is revealed. Just outside Pharasgaon, tribal workers have painted charming murals of tigers, horned game, fish and village scenes on rocks alongside the road. These unusual traffic markers in white paint are most attractive.

There is complete equality between the sexes in all the tribes. Among the Murias, and especially around Narainpur, the institution of the 'ghottal' is common. The 'ghottal' is a dormitory where the boys and girls of the village from the age of about six upwards, live until marriage. The young people work in the fields alongside their parents during the day. In the evening they return to the 'ghottal' where they spend the night in music and dance and instruction in skills and customs that will equip them for later life.

The youths and maidens mingle freely. There are no complexes. Neither is there any promiscuity. Morals, within the tribe, are strict

and regulated by convention But tribal morality tends to crumble easily with outside contact This is an important problem that the Dandakaranya authorities and the administration are studying and must take into account

The *adivasis* may be primitive in many ways But they are not uncivilised Apart from their aesthetic sense they have a highly developed community spirit and system of democracy The village lives a genuine community life in which joys and sorrows are shared Among some tribes, many agricultural operations are done jointly The whole village will join together to clear and burn the forest (in the *jhum* areas where shifting cultivation is practised) Thereafter land is apportioned in accordance with ability to cultivate and the requirements of the family depending on the number of hands to work and mouths to feed There could be no better base for developing co-operative activity among the tribes

Every tribal village has a panchayat and every group of 10 or 15 villages falling within a 'pargana' is under a *manji* The *panchatyatdars* and *manjis* are *hereditary* But the village body can always impeach any [illegible] Any effort on the part [illegible] of the normal pattern

The tribes are grouped in villages according to their different totems In Koraput district, I was interested to find that the Harijans are traders and act as agents of the *sahukars* (moneylenders) in the Kondh villages. If the tribes are to prosper, they must be freed from the clutches of the moneylender and forest contractor

The [illegible]

In this particular tribal block there are 26 000 people in 150 villages The area covered is 46 square miles There are 3,400 cultivating families in the block and 1 800 landless. Agricultural practices have been improved. The fields are being levelled and bunded Better seeds are being used. Green manuring and composting have been introduced Two co-operative farms have been formed in locally reclaimed areas I was unable to ascertain how these have fared. Poultry and cattle development have been taken up Eighty per cent of the village children now attend primary school. There is a primary health centre and three subsidiary health centres in the block.

Although yields have been improved and the people are eating a little better, economic activity, as elsewhere in the area, is limited by the extreme simplicity of tribal needs. There is little incentive for improvement. The *adivasi* is however, an alert and sensitive individual He possesses a fair degree of commonsense and is receptive to new ideas especially if their efficacy is demonstrated to him. He accepts inoculation and anti malarial spraying of his dwelling far more readily than the average villager elsewhere.

In the Narainpur tribal development block there is a small industrial training centre where weaving, carpentry and iron-work is taught. Iron ore is found practically all over Bastar and the *adivasis* here, as in Koraput, smelt iron in simple furnaces and beat the mental into crude agricultural implements Small industry and the processing of forest produce could provide new fields of tribal activity that might make the *adivasi more work minded* At the same time, there is the risk of undertaking development on too wide a front and confusing the tribal mind.

The *adivasi* is still poor and lives in primitive conditions But his living standards have definitely improved in 10 years The area of cultivation has increased, there is better farming, the people wear more clothes and are beginning to earn larger subsidiary incomes The Dandakaranya project will make a big difference The benefits of independence are reaching out to the tribes.

JAGDALPUR, *January 27, 1959*

EXPERIMENTS IN LIVING

IT is the engineers who make news these days But there are engineers of many kinds In Koraput I came across an unusual group of social engineers engaged in experiments in building a new society They belong to the Sarva Sewa Sangh a Gandhian organisation, and have made *gram dan* the starting point of their endeavours

It all began years ago Mohammad Baji or Baji Bhai as he was affectionately known, had already lit the torch of *Sarvodaya* in Western Koraput when the 1942 movement threw up a young man dedicated to lead Vishwanath Patnaik began as a revolutionary but turned social reformer He became the 'agyan' of the *adivasis* in the eastern regions of the district It is these two men who first responded to Vinoba Bhave s call for *bhoodan* and who were able to win over the *adivasis* to the ideal of *gramdan* in large numbers

In *gramdan* the entire lands are made ov
Thereafter, ownership vests in the *Bhoodan*
redistributed for purposes of cultivation exc
of the area which is retained for communal use or communal cultivation.

There are about 2 200 *gramdan* villages all over India As many as 1,483 of them are in Koraput district
Godabas Koyas Savaras and others—hav
consciousness and they readily responded
and Vishwanath Patnaik came to ther
buted about 220 000 acres of land which
sixth part of the total cultivated area in Koraput At this point the Sarva Sewa Sangh took over The task of redistribution of land and further development has since been organised under Annasaheb Sahasrabuddhe, General Secretary of the Sangh, who is now settled at Gopalwadi, a little village near Rayagada, deep in the jungles of Koraput The experiment began in 1954-55

Owing to limitations of personnel and finance, the Sangh has been able to follow up the initial declaration of *gramdan* with actual redistribution in only 741 villages The purpose in view has been to try and redistribute the land on a strictly egalitarian basis in accordance with [illegible] norally per capita a [illegible] where perfect but [illegible] holdings are [illegible]

Gunderigooda village, for instance, has a population of 30 families of whom four were landless *Gramdan* redistribution has been completed and every single individual I was informed, now possesses one acre of land which is his for cultivation. The redistribution was done by the *gram sabha*, an elected body comprising both landowners and landless [illegible] d Kondh. He and his family [illegible] have only ten He admitted [illegible] to supplement their diet with tamarind gruel and forest roots But nonetheless he felt that the sacrifice was worthwhile. The community was better off

Vanjjalakka Siniga, on the other hand, previously had no land. He used to have to do forced labour for six to eight months in the year in order to earn a petty wage Now he and his family have five acres of land and get a full meal for at least three months in the year He still has to supplement his income by doing manual labour, but on a more equitable daily wage basis Times had changed, he said

In other villages, however, some people have gone back on *gramdan* while others have in practice refused to accept the principle of completely equitable distribution of land Consequently, the first redistribution has eliminated landlessness but has left the ratio of disparity at 1·3 or 1 5 To overcome this, the Sangh workers have sought to bring new areas under cultivation either by reclamation or irrigation A further redistribution has then been effected to reduce the disparities. In Garanda village, in Andhra, the land has been redistributed five times in this manner Usually, however, the pattern of redistribution is expected to be left undisturbed for a period of at least five years

Having redistributed land, the Sangh found that the means of cultivation must also be redistributed if the reform was to have any meaning. Accordingly, efforts have been directed towards securing redistribution of bullock power and agricultural implements Or, wherever, necessary and possible, the Sangh has assisted in the purchase of oxen and implements

Another problem arose With the declaration of gramdan and the rise of a new social consciousness in the villages, the sahukar or money-lender left while the administration and the co-operative agencies were

GRAMDAN IN KORAPUT

Number of gramdan villages	— 1,451	Land kept for community cultivation	— 2,695 acres
Number of donors	— 20,324	Agency	— Sarva Sewa Sangh
Land donated	— 219 106 acres	Bhoodan donations	— 49,538 acres
Number of villages in which land has been redistributed	— 741	Number of donors	— 11 962
Area distributed	— 104 985 acres	Area of Koraput	— 9 875 square mile
Persons benefited	— 15,306 families (including 3 932 landless families)	Area under crop	— 1.25 million acres
		Population of district	— 1.27 million
		Tribal population	— 73 per cent
		Literacy	— 5.3 per cent,

unable to advance money to the cultivators who, in effect, did not individually possess land and could not offer any other security The riddance of the *sahukar* was perhaps a blessing But the absence of any source of credit presented a serious problem

It was again possible to find a solution Village co-operatives were organised Each member contributed Rs 1/8 towards the share capital of the society The Sangh then advanced from five to ten times this amount as working capital Members were given interest free loans for specific purposes The utilisation of this credit has been supervised to ensure that it has been properly used The experiment in supervised credit has proved fairly successful Co-operative consumer stores were also opened and the *adivasis* have begun to participate in their management.

The next step was to organise a number of central grain *golas* (co-operative grain stores) to serve groups of *gramdan* villages Previously, the farmer had to sell his grain immediately after the harvest when prices were low He had no holding power Now he is able to deposit his marketable surplus in the grain *gola* in return for an immediate cash payment The grain is bagged, stored and later carried to the local *mandis* in trucks operated by the Sangh The profits after sale, less cost of bagging and transport, are then distributed among the farmers in accordance with the amount of grain deposited by them.

The State Government has just begun to open similar grain stores and the *gramdan* grain *golas* are making over their business to these new societies wherever possible in order to free their resources and men for other activity The introduction of standard weights at the grain *golas* has by itself increased the income of the peasant by protecting him from the unscrupulous under-weighment invariably practised by the *sahukar* and trader

The Sangh simultaneously took up land improvement cattle and poultry development, education, sanitation prohibition and women's welfare. But in time, it became increasingly clear to Annasaheb that among a community in which so much land hunger continued to prevail and which lived amidst such great forest and mineral wealth it was not enough to think only in terms of land and agricultural improvement The exploitation of forest wealth and the varied minerals deposits found so plentifully in the district must find a larger place in the programme and technological standards must be improved in these fields

This idea has now developed into a small industrial research and training division that has established three or four centres in the area in the course of the past 18 months The objectives of the Industries Division of the Sangh have been to investigate the occurrence and extent of forest and mineral resources of commercial significance, to conduct research on processes of industrial utilisation of these resources to prepare actual manufacturing schedules wherever possible and set up pilot plants, train young *adivasis* in various crafts and industrial techniques, and form co-operatives for the collection and marketing and if possible, the processing of the local forest and mineral wealth

The Industries Division has a small but competent staff which includes a technical adviser who was until recently a senior engineer working with a large Bombay firm a wood technologist trained at the Forest Research Institute in Dehra Dun, a graduate of the Institute of Chemical Technology, Bombay, and a geologist Processes have been

developed at the Jeypore centre of the Sangh for the manufacture of tannin extracts from myrobalams (for the tanning industry) which are now being collected and sold by the *adivasis* for ridiculous prices, for the manufacture of stoving enamels from marking nuts, the preparation of textile sizing material from tamarind seeds, the preparation of ascorbic acid from amla and a variety of pickles and preserves

d timber treatment and season- commercial basis The entire - sealing-wax were supplied by the Jeypore centre last year.

Detailed project reports for the manufacture of cement from rich, local deposits of limestone and of tannin extracts from myrobalam have been prepared and submitted to the State Government It is hoped to organise 250 forest labour co-operatives and the Government is reported to have agreed to grant all forest leases to these bodies wherever they exist.

Koraput is littered with iron ore much of which is limonite, a soft, 60 per cent It is, however, too ut lends itself to crude smelting have been operating for cen- ix pounds of crude steel within a few hours and the hot metal is straightaway beaten into simple tools and implements The process is effective but highly inefficient as only 10 to 15 per cent of the iron is recovered from the ore, the rest running to waste as slag

The Industries Division had improved this process so as to make possible a a higher recovery ratio The new process is quite as simple and inexpensive as the original and is now being tested out Some very interesting results might follow

The concept of *gramdan* has grown in four years It began with land and has now progressed to cover many other aspects of social and economic activity The difficulties continue Practical and legal difficulties have come in the way of registration of the *gramdans* The official processes of registration of co-operatives has been so painfully slow and cumbersome that none have been registered so far Official co-operation has not always been forthcoming, especially at the lower levels, as established vested interests have been affected Proper liaison has yet to be made with the community projects which do not appear to have made much headway in the district. The paucity of men and money has been a constant handicap

Despite all this, *gramdan* has not failed The tangible res... be small and scattered ... begun to make administration. ress. It has serv to human happin no one has carec band of men whc and experience w ... could easily command substantial salaries in the cities ... are men of quality But something called them to Koraput.

Gramdan will not be able to solve the problems of India That job is for the Government. But *gramdan* has been able to light the way. It has become a valuable catalytic agency in a process of social transforma-

tion. It has paved the road for the Dandakaranya project in Koraput and it is now necessary that the Dandakaranya Development Authority and the Sangh work hand in hand Their objectives are similar. Together they will succeed in building a new society.

RAYAGADA, *January 29, 1959.*

THE SHIPBUILDERS

INDIA has a long seafaring tradition and the sturdy wooden vessels built along its coast sailed the waves for many centuries Indian shipbuilding, however, never entered the steel age until very recently It was in 1941 that Scindia's took up a project for constructing a modern shipbuilding yard at Visakhapatnam. The war delayed progress and the keel of the first ocean-going vessel was laid in June 1946 Two years later, the 8,000-ton "Jala Usha" was launched

Last July another ship was launched, the twenty-fourth, bringing the total tonnage built by the Yard to just over 100,000 tons

A hundred thousand tons in ten years is not a phenomenally large output But it represents a beginning, the acquisition of a new skill, progress in a new field of technology The Yard had to be expanded, too, as the demands on it increased In view of this and consistent with the industrial policy resolution of the Government of India—which lists shipbuilding among the strategic industries which have been reserved as a Central Government monopoly—the Yard was nationalised in 1952. Nonetheless, Hindustan Shipyard remains unique among public sector enterprises in so far as 22 per cent of its share capital is still privately owned by Scindia's

Four keels can be laid simultaneously at Hindustan Shipyard After a ship is launched it goes to an adjacent jetty where it is fitted out and the engine is installed So far the vessels built at the Yard have not exceeded 6,000 tons, but these have been of five types

Multiplicity of designs has added to costs and affected efficiency It is therefore now proposed to build ships of standardised designs of 9,500 tons and 12,500 tons, three of the former and six of the latter These will be general purpose fast cargo vessels and will take about 20 months to build from the laying of the keel to the date of delivery. Similar ships have been built in German shipyards in 15 months The longer building time at Visakhapatnam is largely accounted for by the considerable delay in procuring equipment and supplies, 60 per cent of which have to be imported.

The entire engine, most of the ancillaries and the bulk of the steel have to be imported The shipbuilding industry needs special, soft steel in odd sizes which the Indian steel plants do not find economical to roll because of Hindustan Shipyard's very limited offtake. This same reason is responsible for the very slow growth of ancillary industries although every effort is being made to develop indigenous capacity.

Shipbuilding is a complex business A small drawing and designs office has been established but, with perhaps one exception, all the ships built so far have been designed abroad. Hindustan Shipyard has merely purchased the designs The one ship designed at Visakhapatnam, *S S Andamans* has proved a little defective No tears need be shed over this Individuals and countries learn by mistakes Our designers are learning by experience and they will no doubt very soon be in a position to prove their skill.

The technical direction of the Shipyard was entrusted to a French firm of consultants until last July when this responsibility was entirely taken over by Indian personnel The designs of the ships being built at present have been purchased from a firm of German shipbuilders which has also agreed to make available two or three experts in the capacity of advisers as and when required The services of an experienced draftsman have already been secured under this arrangement

The efficiency of the Visakhapatnam Yard has shown a steady upward trend with the passage of time The annual value of production has increased while the labour-materials ratio has improved Building costs have, however, gone up as they have elsewhere especially on account of the rising cost of materials The first few ships built at the Yard were predominantly rivetted They are now being increasingly welded and very soon the older method will be more or less discarded This has, in turn, created other problems Certain categories of labour have been rendered redundant but are still maintained on the rolls in accordance with Government's policy of avoiding retrenchment. Efforts are now being made to re-train the idle hands in new skills, such as welding, so that they can be absorbed in other departments Certain personnel may also be found employment in other public enterprises

Although the Shipyard has a capacity for building four vessels per annum of up to 15 000 tons each its output is at present limited to about two-and a half ships per annum and ships of a smaller tonnage Difficulties in the availability and flow of materials have constituted the main bottleneck. The commissioning of the new prefabrication shop will streamline the flow of materials and facilitate production

Speedier construction and consequently a higher output, will reduce overheads and bring down the cost of ships The establishment of a second shipyard, as is proposed in the Third Plan, will also encourage the development of ancillary industries on a slightly more economical basis As at present the Government has to subsidise the ships built at Visakhapatnam to the extent of about 20 to 25 per cent The subsidy is equivalent to the difference between the cost of production at Hindustan Shipyard and the estimated cost of construction of a similar vessel in the U K The economics of the Yard will be a little more favourable with the implementation of the second phase of development which includes the extension of the fitting jetty and modernisation of equipment This has yet to be sanctioned The proposal to construct a dry-dock has been approved in principle but has had to be postponed on account of foreign exchange difficulties.

Indian shipbuilding has still a long way to go But it has started out towards getting there

VISAKHAPATNAM *January 30, 1959*

MANY CARGOES

A CONSIDERABLE volume of raw material and capital goods imports is required to implement the Five-Year Plan and an export drive has consequently had to be launched in order to meet the bill The growth in the country's sea-borne trade has therefore necessitated a considerable expansion of port capacity and handling facilities in all of India's major ports According to the Plan, port capacity is to be doubled to 40 million tons per annum by 1961

On the east coast, Visakhapatnam has become the port of entry for all the plant needed at Bhilai Special equipment has had to be installed to handle these heavy structures It has also had to cope with an ever-increasing volume of ore exports, especially iron and manganese

Visakhapatnam is a young port with a big future The first ocean vessel entered the new harbour in 1933 For 50 years previously ships had had to anchor two miles out at sea and unload their cargo into country-boats Dredging and reclamation works were taken up and a channel was made to enable steamers to enter the creek and sail into a basin enclosed by hills out of sight of the sea This is the harbour Two old ships were filled with boulders and concrete and sunk just outside the inlet channel to serve as a breakwater and direct the coastal drift of sand into a huge sand trap

The port can at present handle about a million tons of ore, a million tons of oil and refined petroleum products, which are piped to and from the Caltex refinery, and half a million tons of general cargo But only ships of 28 5 feet draft and 550 feet in length can normally enter the port This is no longer good enough India has recently entered into a contract with Japan for the supply of two million tons of iron ore per annum for ten years from 1964 Visakhapatnam is to be the outlet and the port has to be developed to meet this increase in traffic

Four new berths are to be constructed at a cost of Rs 4 5 crores Two of these additional berths will be for general cargo and the other two for mechanical handling of bulk ore traffic At present, ore is loaded at the rate of 2 500 tons per day by manual labour The new ore berths will be fitted with a conveyor belt system which will be capable of handling 2 000 tons per hour But increased handling and berthing capacity is, again, not enough The Japanese would like to use large ore carriers to transport the ore and so the entrance channel is also proposed to be widened and deepened so as to accept ships of up to 35 feet draft and 650 to 800 feet in length

This expansion programme will not exhaust the entire potentialities of Visakhapatnam There is space enough to accommodate 14 berths in all as against four as at present It will also be possible to expand the naval base, if necessary

Among the functions Visakhapatnam performs along with Madras is that of lightening and topping up vessels sailing to or from Calcutta, the country's busiest port Calcutta is the principal outlet for tea jute and coal exports and serves four of the five steel plants (excluding Bhilai) as well as the rapidly developing D V C area

River ports have their own peculiar problems But the Hooghly is perhaps, the trickiest river in the world and the river survey and pilot-

age needed to navigate its perpetually migrant channel calls for the highest skill. Yet while the demands on Calcutta have increased, river conditions on the Hooghly are not as favourable as they were at the time the port was opened in 1869 or even 20 years ago

The delta of the Ganga has numerous channels But originally, the main arm used to be the Bhagirathi which falls into the Hooghly Over the past one or two hundred years however, the Ganga has increasingly favoured the more easterly channel the Padma, which has meant a progressive diminution of headwater supplies flowing into the Hooghly About 30 or 40 years ago the Bhagirathi ceased to be a perennial river Ever since then the loss of headwaters to flush the Hooghly has led to the accumulation of silt and a gradual deterioration of river conditions at Calcutta. Increased salinity has also created a drinking water problem

Apart from affecting navigation depths, the reduction in headwater supplies has increased the intensity of the tidal bores experienced in the Hooghly This again has tended to limit port capacity as every vessel in the stream has to be berthed during bore tides

There is however yet another major problem Calcutta is 126 miles from the sea by river and there are as many as 14 bars in the channel 11 of which are in the 35 mile stretch between Calcutta and Diamond Harbour All these bars are temperamental and are subject to considerable fluctuations in magnitude and character On account of this phenomenon as well as the sharp bends in the river restrictions have to be imposed on the draft and length of vessels entering the port.

The problems of resuscitating the river and curing the bars has engaged expert attention for some time and temporary relief has been sought by constant dredging. But these efforts have not fulfilled the objective of ensuring a minimum navigable draft of 26 feet on every day of the year The situation has deteriorated to a point where a 26 foot draft is not available for more than about 120 days in the year, while the minimum drafts go as low as 18 and 19 feet Some river training works h... nearly Rs 5 crores, bu... ng (shallowest) bar wh...

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In this situation two remedies are possible Both must be pursued Steps must be taken to replenish the headwater supplies of the Hooghly The Ganga Barrage Project may achieve this by diverting part of the waters of the Ganga from the Padma to the Bhagirathi This is under investigation. The other measure is to locate an ancillary port down the river beyond the more difficult bars Such a project would be quite feasible and a suitable site has indeed been found at Haldia which lies below the Balari bar and would give a minimum draft of 26 feet for six months and between 28 and 30 feet for the rest of the year These drafts could be further improved if the two smaller bars below Haldia were dredged.

Haldia has other advantages It would avoid sharp river bends and would therefore, not be subject to restrictions regarding the length of ships It would relieve congestion at Calcutta provide a more favour-

able point for lightening and topping up vessels than either Visakhapatnam or Madras and improve the turn-round of shipping

The Calcutta port authorities hope to use Haldia as an open anchorage for lightening—especially food ships—and topping up vessels from next winter. Being near the estuary of the river and subject to southerly winds, Haldia could be used as an anchorage for only five months in the year. In time, it will, therefore, be necessary to convert it into a proper auxiliary port with adequate berthing facilities and a railway link to Kharagpur.

The Hooghly is a tricky river, but not so tricky that it cannot be tamed.

VISAKHAPATNAM, *January 31, 1959.*

THE LIVING AND THE DEAD

YOU will not find Vijayapuri on any map Yet it is an ancient and gracious city, the capital of the Ikshvaku kings, tributaries of the Satavahanas, who ruled the lands between the Krishna and Godavari in the third and fourth century A D. from their citadel in the Nagarjunakonda Valley.

It was here that the great Buddhist sage and philosopher, Nagarjunacharya, lived and taught Those were days of tolerance Although the kings were Hindus, their queens were Buddhist Vijayapuri became a great centre of trade and Buddhist learning Scholars came here from Ceylon, Kashmir, Gandhara and China and there was trade with Rome. The land was prosperous. The arts flourished For a while, at least, there was no external challenge *Ashvamedha* (the horse sacrifice) was performed.

It is not known what disaster suddenly befell this happy kingdom; but it disappeared from history after a brief 150 years The Krishna covered it with its sand The jungle grew over it For centuries, Vijayapuri was lost until it was discovered only 25 years ago The archaeologists rubbed their hands But little did they know that the engineers had also discovered Vijayapuri, or Nagarjunakonda—as the site for a great dam that would irrigate hundreds of thousands of acres of famine land in the Rayalaseema districts of the new Andhra.

The Nagarjunasagar project was born, investigated, and sanctioned for commencement with the Second Plan The reservoir will begin filling in another two years and very soon the city of Vijayapuri, so recently found, will be lost for ever, submerged under the waters that will bring new prosperity to an impoverished peasantry. The lake will be named Nagarjunasagar and the project township, Vijayapuri, in tribute to the past. And in the middle of the waters, on a hill-top island, is to be built a museum that will house the excavated treasures of the ancient city

The site of Nagarjunakonda is older than Vijayapuri. The archaeologists, digging with desperate haste, have discovered very interesting pro-

historic remains dating back to 1000 B.C.—varieties of palaeolithic tools, microliths, graves of neolithic man and megalithic pit circles. The ruins of Vijayapuri are, however, more extensive and have attracted greater attention.

to the Krishna, the citadel with its stout rampart, moat, gate and army barracks; pottery; a jar containing the most elegant gold necklace and ear-rings together with a Roman coin; and contemporary inscriptions in both Prakrit and Sanskrit that throw considerable light on the life and events of those times.

The ruins extend over 3,600 acres in a bowl carved out by the river. The archaeologists are first digging the floor of the bowl, rescuing the sculptures and other art objects

For some archaeolog

The Nagarjunasagar dam will, in the first phase, rise 330 feet above the river and run nearly three miles across the valley. The central portion will be of masonry (which is cheaper than concrete) and the two wings of earth. The storage will be 5.44 million acre feet and will be sufficient to irrigate about two million acres. The cost will be Rs. 88 crores. The dam is however so designed that its height can be subsequently raised to 380 feet to augment the storage to 9.30 million acre feet of water, the largest in volume of any project in India. With this additional storage it will be possible to irrigate 3.2 million acres of land, much of which will include hitherto uncultivated tracts in Rayalaseema, and generate 75,000 kw of firm power. The total cost of both stages will

NAGARJUNASAGAR PROJECT

DAM

Type — Masonry cum Earth
Total length — Nearly 3 miles
Masonry section — 3,900 feet

		Stage I	Stage II
	Height	330 feet	380 feet
RESERVOIR	Storage	5.44 m.a.f.	9.30 m.a.f.
	Waterspread	74 sq. m.	110 sq. m.
BENEFITS	Irrigation	2.06 m. acres	3.2 m. acres
	Power	—	75,000 k.w. (firm)
	Flood Control		
COST		Rs. 87 crores	Rs. 137 crores
COMPLETION		1963-64	(not sanctioned)

able point for lightening and topping up vessels than either Visakhapatnam or Madras and improve the turn-round of shipping.

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the shores of Nagarjunasagar, children will play and go to school in the new city of Vijayapuri

VIJAYAPURI *February 1, 1959*

A COTTAGE BLAST FURNACE

INDUSTRY in India had for long tended to develop along the lines of large plants or technologically backward and economically inefficient cottage units The growth of small power based units manufacturing smaller items or parts and components for the large manufacturer was relatively tardy until the last war when the non availability of imports and the demands of the war effort brought into being a number of small engineering industries many of which continue to flourish These units have added greatly to the country's industrial potential created new employment opportunities stimulated regional development on a decentralised basis and functioned as laboratories for new ideas and experiments and a training ground for managers and technicians

In order to stimulate the further growth of small industries the Government has planned to establish a number of Industrial Estates throughout the country The principle of the Industrial Estate is that the State develops industrial colonies with the basic facilities of factory buildings, water and power supply, roads drainage and possibly other common services and then invites small entrepreneurs to step in on a rental basis and commence manufacture This enables men of enterprise but without large capital to undertake production

One such Industrial Estate has been built at Guindy, a suburb of Madras The foundation stone was laid about two years ago and the Estate is now a hive of manifold industrial activity It is estimated to cost Rs 70 lakhs and will extend over 100 acres

A small scale industry has been officially defined as one with an investment not exceeding Rs 5 lakhs and employing up to 50 men if power based and not more than 100 men if no power is used Seventy-eight units have gone into production at Guindy and there are in addition some 15 Government manufacturing service and training units such as a model foundry a chemical testing laboratory, a servicing corporation for supply of raw materials a hand tools unit which manufactures and supplies small tools, a wood working and wood seasoning unit a pressure-die casting unit and a technical information centre These Governmental units have proved of great assistance to the private manufacturers

The range of private manufacture is considerable The products include high tension accessories electric motors electrical switch gear bolts nuts rivets gears waterproof and special papers parts of fountain pens, water meter components engineering metal parts various castings and forgings, polythene films and cinema equipment, radios and components, bicycle parts, builders hardware spectacle frames tin con-

be about Rs 135 crores Only the first stage has however been sanctioned so far

Two main canals will take off from the dam on either bank The right bank canal will in the first stage run for 133 miles and will have a capacity of 11 000 cusecs In the second stage however the canal is proposed to be extended to 271 miles and deepened to carry a discharge of 21 000 cusecs, the largest of any canal in the country The canals have to negotiate difficult hill country to reach the plains that they will irrigate Both will initially escape through tunnels of considerable length—about a mile and a quarter in respect of the right-bank canal Even thereafter, they will pass deep cuttings of up to 120 feet This is no easy project

The right bank canal alone will cost Rs 61 crores in the ultimate phase or nearly twice as much as the entire dam and more than either the Rihand or Kosi project But it will virtually be a new river throwing out innumerable distributaries into parched fields

Some of the work is being done departmentally, but most of it has been given out on contract The canal contract has been broken down into units of Rs 10 lakhs each and over 100 contractors are engaged on the right-bank canal Some work has also been given to labour co-operatives organised by the Andhra State Co operative Department for contract values of up to Rs 25 000

On the left bank canal some work has been allotted to the Bharat Sewak Samaj It was given two miles last year and has been given a contract for another mile this season for a total value of about Rs 13 lakhs No security has been sought from the B S S as in the case of the labour co-operatives for work in excess of Rs 5 000 On the other hand the B S S has been given advances for the purchase of equipment.

The B S S has been given contracts on the basis of commercial tenders for the two adjacent reaches This year its contract is for 95 per cent of the project estimate in view of the concessions offered to it The B S S has its own engineers and overseers and its work has generally been found satisfactory About 800 to 1 000 men were engaged on the B S S sector last year and four per cent of the takings were diverted into a community savings fund from which certain local works have reportedly been financed

The area through which the canal passes is sparsely populated and so B S.S labour has to be procured from much the same sources as the contract labour and often through similar agencies

The outturn on masonry work on the dam is about 80 000 cubic feet per day as against the target of 140 000 cubic feet But the tempo of work is gathering momentum in all sections of the project

The Nagarjunasagar project is one of the greatest river valley schemes undertaken since independence It will link up with a 500 000 kilowatt power dam proposed to be built further up the Krishna at Sri Sailam in Kurnool District and the Pulinchintala Dam down the river, which will provide irrigation for an additional 300 000 acres

When it is complete the sculptures of an ancient civilisation will from their abode atop the Hill of Nagarjunakonda look down upon a sea of waters that will usher in another era of prosperity in Andhra And on

pig iron at less than the cost it would have to pay in the Coimbatore market. Moreover, until recently, there was a country-wide scarcity of pig iron and market supplies were by no means easily available

of certain castings
a not inconsiderable
blast furnace gases to generate a little electricity and convert the slag into cement

The blast furnace built by Textool is of the simplest kind. But it has proved a success despite its small size which adds to overheads. The availability of carbonised lignite briquettes from Neyveli within a few years may render iron making a commercial proposition all over South
es in low-shaft furnaces. Mean-
what can be done with initiative
t furnaces are smaller and even
Textool.

Textool, however, needs more than pig-iron. Special and alloy steels were required for the textile machinery it was making and for certain machine tools. These too were either in short supply or totally unavailable. So again the management decided to make them in the company's own workshop. Since that decision was taken one small electric-arc furnace and two oil furnaces have been designed and built. A slightly larger electric-arc furnace with a capacity of a ton per day is also under construction. Textool is now in a position to make its own tungsten, nickel, chromium and other steels which the country is at present importing.

Special steels by themselves are not enough. They have to be rolled. So Textool fabricated a tiny rolling mill which is capable of rolling steel to all the sizes needed by the firm.

Altogether, the small band of engineers in Textool have done a remarkable job. I talked to some of these men.
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they were convinced that they should
design, adapt and build anything they needed and they have in fact done so.

Textool is a small plant. But it is manned and managed by men of talent and enterprise who have been able to do things that engineers of large concerns that I have visited have declared to be impossible. In Textool, nothing is impossible. Everything is a challenge and a new field for experiment. The little blast furnace amidst the palms and fields of suburban Coimbatore is a splendid vision of the future.

COIMBATORE, February 4, 1959

tainers, aluminium ware, mathematical instruments conduit pipes automobile spare parts, pins and clips, clocks and tractor parts These are all genuinely small units and they are doing a good job of work. Many of them supply leading manufacturers in all parts of the country as well as State Governments and the Railways

The Guindy Industrial Estate like many new ventures has had its share of teething troubles There have been raw material difficulties that have driven some units perilously near closure Other units have been embarrassed by an alleged revision of the terms of loans initially offered by the National Small Industries Corporation for the purchase of plant and equipment One firm complained that the Corporation had gone back on its terms regarding the number of instalments in which repayments have to be effected Its young engineer proprietor also complained that the Corporation was taking commissions for purchase of equipment from various suppliers but was not passing this benefit on to the consumers in the Industrial Estates on whose behalf the orders were being placed On the contrary the Corporation was charging 10 per cent of the cost of the machines above their quoted prices Further since the loanees had to purchase machinery through the Corporation they were sometimes compelled to pay sales tax twice over instead of only once as would be the case if they were able to buy the equipment directly as actual users

The National Small Industries Corporation is a most useful institution But the kind of complaint heard at Guindy needs to be put right

Industrial Estates are however by no means the sole promoters of small scale industry Numerous small units have been developed in the normal manner through private initiative and finance A striking example of a small to-medium unit that has pioneered new fields is Textool Ltd., Coimbatore

Textool as its name suggests, manufactures textile machinery It specialises in spinning equipment But it does and thinks much more than that It is a veritable industrial laboratory managed and run by a young team of brilliant and daring engineers

Textool was started in 1946 and has a paid up capital of Rs 20 lakhs It has been built up to take care of all its requirements After the initial installation of plant and a small machine shop, the policy of the management has been to make everything needed in the company s own workshop Textool has accordingly built its own replacement machinery; including high priced special and automatic equipment which would otherwise have had to be imported These home-made machines are cheap and efficient and have given good service

Raw materials was a problem So Textool decided to make its own pig iron and special and alloy steels Mr D Balasundaram the Managing Agent and his engineers read up ancient and modern literature about blast furnaces and then proceeded to design and build one Textool was licenced to install a blast furnace with a capacity of 15 000 tons per annum (50 tons per day) and the plant was designed fabricated in the workshop and erected in 15 months and was formally inaugurated by Mr Lal Bahadur Shastri Minister for Commerce and Industry last May

The blast furnace uses high quality iron ore from Kotagiri 45 miles away in the Nilgiri Hills and local limestone Coke has however to be procured from Bihar and constitutes an expensive item The furnace cost about Rs 7 to 8 lakhs to build and Textool finds

first load of over burden is being dumped into the spoil heap that will make an artificial hill Thereafter, the earth and rock, during the production phase, will be filled back into the areas already worked.

Conventional heavy earth moving equipment is being used to remove the over-burden. Scrapers, loaders, dumpers, bull-dozers, mobile shovels and a host of other machines cut and carry away the rock in a roar of activity in two shifts from six in the morning until ten at night These machines will soon be reinforced with and, during the production phase entirely replaced by huge, modern bucket wheel excavators imported from Germany and belt-conveyors assisted by slewable spreaders to handle the earth

Removing the over-burden is a major operation if only because of the magnitudes involved But the terrain is difficult, too After the first few feet of earth, the bulk of the over burden consists of Cuddalore sand-stone which is soft when moist but tremendously hard when dry Constant wetting is, therefore, necessary

This, however, is the least part of the problem Much more tricky is the existence of a layer of water trapped under the lignite bed at considerable pressure The only thing that *holds* this water down is the weight of lignite and rock above it If the over-burden and lignite were removed the water would exert a powerful upward thrust to burst out of imprisonment and flood the mine This obviously cannot be allowed to happen for it would mean loss of lignite and danger to human life

In order to overcome this problem elaborate pumping tests were carried out with the assistance of a British firm of consulting engineers Messrs Powell Duffryn Technical Services Limited, whose services have been secured under the Colombo Plan These tests proved that the pressure surface of the artesian water could be reduced to a safe level below the lignite by constant pumping from a suitably designed pattern of wells

Pumps are already being installed and when mining operations begin in 1961, approximately 48 000 *gallons of* water will have to be pumped out every minute, from forty-eight wells, in order to control the artesian water

If th[illegible] a bles[illegible] it has also proved as con[illegible]nd water, as much water [illegible] [illegible]cation or industry The [illegible] of the artesian basin will be used for the mining ope-

NEYVELI LIGNITE

Reserves	— 2 000 m l on tons (100 square m les)
Area to be worked	— 200 m ll on tons (3.5 square miles)
Depth of seam	— 180 feet below ground level
Thickness of seam	— 55 feet (ave age)
Annual Production	— 3.5 m ll on tons
Utilisation	— Power (1.5 mill on tons) — 250 000 kw (1961-62) Fertilizer (0.3 million tons) — 152 000 tons of urea (March 1962) Briquetting & carbonising — (1.5 million tons) 380 000 tons carbonised briquettes 51,300 tons tar 43 000 tons char dust 6 400 tons motor spir t 1 052 tons phenol
Cost	— Rs 70 crores
Agency	— Neyveli Lignite Corporation (Private) Limited

BURIED TREASURE

TWENTY-SEVEN million cubic yards of earth and rock are being dug out of the ground at Neyveli and dumped in a great spoil-heap to make a 100-foot high hill with a spread of 600 acres. This is quite a big hill, possibly the biggest in the district.

Twenty-seven million cubic yards of earth is also a lot of earth. It is enough to make more than five Bhakra Dams.

As a matter of fact, it is intended to dig up 27 million cubic yards of earth, and possibly more, every year for several generations. The result of this effort will transform industrial prospects in South India and make possible a more rapid and varied pattern of industrialisation. The excavation of 27 million cubic yards of earth-rock at Neyveli will uncover a bed of lignite some 180 to 200 feet below ground level. The initial mine-cut will be 6,000 feet long and 1,000 feet wide. The lignite seam has an average thickness of 55 feet and extends over 100 square miles.

The lignite is of high quality and the reserves are estimated at 2,000 million tons. The present project envisages the mining of 3.5 million tons of lignite per annum from an area of five and a half square miles where the seam is most easily workable.

Lignite is younger brother to coal by a couple of million years, a small matter in geological time. Coal itself is the end-product of a long process of chemical transformation. The decay of forest and plant matter millions of years ago resulted in peat. In time the peat got covered over and, under the pressure of the earth above it, was converted into lignite, an inferior type of coal, light in weight and brown in colour. Still later, the lignite was compressed into coal. In terms of thermal (energy) value, a ton of (high-grade) coal would be equal to two-and-a-half tons of lignite.

Now the problem of South India has been the absence of coal deposits except in the Singareni fields in Andhra, 350 miles north of Madras. Coal is the very life-blood of industry. It can be burnt to generate power or gas, or used in metallurgical industries or distilled into various chemicals and drugs. In the absence of coal, the progress of industrialisation in the South has been severely handicapped. Coal imported from Singareni or the coalfields further north (from which alone coking-coal is available) is naturally expensive on account of the high cost of freight on long-distance haulage.

South India is fairly rich in hydro-electric resources but power from this source is liable to fluctuations in accordance with the timeliness and quantum of rainfall which, in turn, regulates the storage available for generating power.

The exploitation of Neyveli lignite—only 150 miles south of Madras—is, therefore, a project of great significance which will open up new vistas of development all over the South. But this is easier said than done. A great deal of time, ingenuity and money will be needed to produce the desired results. But the results are virtually assured

First, the lignite has to be won. According to the mining programme now envisaged, this will entail the removal annually of 27 million cubic yards of over-burden to uncover an area of lignite bed that can be worked to yield three and a half million tons of mineral every year The

heap that will
ng the produc-

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	380 000 tons carbonised briquettes
	31,200 tons tar
	43 000 tons char dust
	6 400 tons motor spirit
	1,032 tons phenol
Cost	— Rs. 70 crores
Agency	— Neyveli Lignite Corporation (Private) Limited

rations and to cool the thermal plant and other industrial units proposed to be established in the vicinity The pumps will also provide water for the township and any surplus will be diverted for irrigation. Without an adequate supply of water, the Neyveli lignite project might never have been possible

In the first stage, it is proposed to mine 3 5 million tons of lignite per annum Of this 1 5 million tons will be used to generate 250 000 k.w of power in a thermal station to be erected with financial assistance from the Soviet Union. The first unit of 50 000 k w is expected to be commissioned by March 1961 and the remaining units a year later This power will firm up the Madras electricity grid which is at present very largely dependent on seasonally fluctuating hydro-electric supplies

Raw lignite is bulky and liable to spontaneous combustion To be transported it must be briquetted after lowering its moisture content to below 15 per cent It is accordingly proposed to process 1 5 million tons of lignite annually to produce 380 000 tons of carbonised briquettes suitable for domestic use, together with lesser quantities of char dust, motor spirit, tar and phenol A pilot carbonised briquetting plant has been installed with T C.M aid and if orders are placed sufficiently early, it should be possible to undertake commercial manufacture by 1962 The remaining half million tons of lignite is proposed to be used for the manufacture of 152 000 tons of urea a highly nitrogenous fertiliser Tenders have been called and Neyveli fertiliser may be on the market by March 1962

The output of lignite could well be stepped up to six million tons or more per annum to feed low-shaft furnaces for the iron industry and for other industrial uses

The cost of the entire project is at present estimated at Rs 75 crores The raw lignite is expected to cost Rs 10 a ton or Rs 25 per ton-equivalent of coal in terms of thermal value as against an actual price of Rs 45 and Rs 80 per ton of coal delivered in Madras by rail and sea respectively The project is being undertaken by a Central Government Corporation, the Neyveli Lignite Corporation (Private) Limited

Work at Neyveli is a little ahead of schedule and the site presents a scene of great activity under the watchful eye of the Deputy General Manager (Technical) Mr A. Srinivasan a dynamic engineer who was one of the principal builders of the Lower Bhavani Project

One of the most remarkable features of the project is the extraordinarily meticulous and minutely organised system of maintenance and repair of all earth moving equipment Equipment is limited So are the spares There is no foreign exchange for replacements The machines have to do a terrific job of work and they can do this only on the basis of a thoroughgoing system of maintenance Breakdowns would set back the production schedule

All the equipment on wheels and crawler tracks are separately washed and serviced every night between the end of the second shift at 10 p.m. and the commencement of the morning shift at 6 a m Service charts have been prepared Some parts need to be serviced daily others every fifth day and still others every ninth eighteenth and thirty sixth day respectively The machines are grouped in batches requiring one day service, fifth day service, ninth day service and so on and every single

part of every single machine is cleaned, oiled, repaired or replaced every thirty sixth day.

The servicing has reached such a peak of efficiency that the ratio of 'idle hours' for the machines has been reduced to 8 per cent, a figure probably attained in very few establishments in the world. The excellence of the maintenance has also cut down the consumption of spares The life of most of the earth moving equipment is placed at 10,000 hours by the manufacturers who also estimate a 100 per cent consumption of spare parts on maintenance during this period The Neyveli machines have been worked just about 4,000 hours and, according to the manufacturers' specifications, should have consumed over 20 per cent of spares. In Neyveli, however, spares utilisation is still below 5 per cent. The thoroughness of the maintenance calls for organisation and some additional expenditure But the latter is far out-weighed by the total savings in money and from improved efficiency

All projects using heavy earth moving equipment and motorised vehicles including the Armed Forces and Municipal and State Transport Authorities would be advised to visit Neyveli and study the maintenance system in operation there There is well over Rs 100 crores worth of heavy earth moving equipment in the country on Government account alone The Neyveli standard of maintenance could result in a saving of Rs. 5 to Rs 10 crores

The Neyveli project holds out great promise It is being executed with vigour and determination.

NEYVELI, *February 3, 1959.*

TUNNELLING FOR POWER

CONSIDERABLE violence is being done to geography in the Nilgiris, but for a very good cause

Although Madras is one of the leading industrial States in the Union, its development has suffered greatly on account of power cuts ranging from 25 to 75 per cent of the normal supply for several months in the year The situation was particularly bad last year and an important industrial centre like Coimbatore, for instance, received 100 per cent supplies for only five months. Production was severely affected and plant and labour were rendered idle

At the end of the First Five-Year Plan the Madras grid had an installed generating capacity of 256 000 kilowatts The bulk of this capacity was in terms of hydro-electric power which is naturally subject to seasonal fluctuations in accordance with the storage levels in the reservoirs The Mettur Dam Power House, for example, can supply 40,000 kilowatts when the reservoir is full but only 17,000 kilowatts in the lean season.

In order to even out these fluctuations and also cater to the rapidly expanding demand for power, a number of thermal and hydro-electric

schemes have been taken up under the Second Plan Among these is the Kundah Project in the Nilgiri Hills which will initially generate 180,000 kilowatts of power and 335,000 kilowatts in the ultimate phase The approximate cost of the two phases will be Rs 35 crores and Rs. 20 crores respectively.

The Kundah project is a very interesting scheme because it combines the storage of relatively little water with a head, or drop, of 5,200 feet to generate a large block of power in three or possibly four power stations

The Nilgiri District of Madras is the smallest in the State and almost entirely mountainous It catches both the monsoons and has a rainfall ranging from 140 inches in the east to 60 inches in the west All this rain collects in numerous mountain rills and streams and drains into the plains in two main channels, the Kundah and the Upper Bhavani. The Kundah joins the Upper Bhavani in the plains to form the Lower Bhavani River across which an irrigation dam was built five years ago, the first major river valley project to be completed after independence

The Kundah project visualises a connected storage for the waters of the Kundah and the Upper Bhavani rivers and their tributaries These waters will be utilised for generation of power in their descent from the Nilgris and will then be trapped for irrigation behind the Lower Bhavani Dam

To achieve this, about a dozen dams will have to be built amid the Nilgiri tea gardens at an elevation of about 5,000 to 7,000 feet and the storage of each connected to the other by a series of tunnels aggregating some 25 miles in length This is no small undertaking in view of the difficult terrain which is strikingly illustrated by one of the newly-constructed project roads connecting Power Houses Number One and Two which climbs 3,000 feet in seven miles on a great staircase of 36 hairpin bends

The Kundah Project will completely alter the flow of the rivers, diverting them in directions that are sometimes diametrically opposite to their normal course Several water-beds will become more or less dry and many cascades and one 500-foot waterfall on the Kundah river will disappear except during the rains The waters of the Nilgiris will be united on top of the hill instead of at the bottom and the people of Madras will be the better off because of it

The first phase of the Project includes two stages of which the first contains the basic dams and tunnels The Kundah itself is formed by two little streams, the Avalanche and the Emerald both of which are to be

KUNDAH PROJECT

STAGE — I — *Avalanche and Emerald Dams*
Type — Masonry
Height — 200 feet each (approx)
Length — 1,200 feet each (approx)
Combined storage — 5 400 million cubic feet
Storage Link Tunnel — 2 400 feet
Two Power Tunnels — 25 000 feet

STAGE — II — *Upper Bhavani Dam*
Storage — 3 047 million cubic feet
Storage Link Tunnel — 8 000 feet

Cost of Stages I & II — Rs 35 crores
Power — 180 000 kw

STAGE — III — *(Under Investigation)*
About six small dams
Additional storage — 2 700 million cubic feet
Link storage tunnels — 65 000 feet (approx)
Power Tunnel — 30 000 feet (approx)
Power — 155 000 kw

OVERALL — Storage — 11 150 million cubic feet
Tunnels — 25 miles (approx)
Power — 335 000 kw

dammed just above their confluence at two sites within half a mile of each other and about 14 miles from Ooty. A single dam below the confluence was not possible because of difficult foundation problems. However, the Avalanche and the Emerald dams will [illegible] the two valleys at full storage level to so be connected at bed level by means of a 2400 foot long tunnel.

A hydel canal will take off from the lake and pierce the hills through a tunnel of nearly three miles. The water will then be dropped 1,180 feet through penstocks to Power House Number One. Having driven the turbines the water will again be caught behind a diversion dam and led into another hydel canal which will in turn pass through a two-mile tunnel before entering another series of penstocks over a drop of about 2,500 feet to Power House Number Two.

In the second stage of the Project the Upper Bhavani river will be dammed and the waters of its catchment area diverted into the Avalanche-Emerald lake by means of a tunnel. This additional storage will increase the generating capacity at Power Houses Number One and Two from 145,000 kilowatts to 180,000 kilowatts. The first two stages of the Project have been sanctioned and are being executed simultaneously. The Avalanche-Emerald [illegible] store water by the end of the year [illegible] into operation from next year. The [illegible] by 1961.

In the third stage the waters of a number of other streams will be impounded and connected to the Avalanche-Emerald lake by means of a series of canals and tunnels to provide a total storage of a little over 11,000 million cubic feet. The capacity of Power Houses Number One and Two will be further augmented to about 225,000 kilowatts and the water passing through the second power house will be caught and carried through yet another five-mile-long tunnel and dropped 1,500 feet to generate an additional 100,000 kilowatts of energy at Power House Number Three. The last scheme is however still under investigation and an alternative proposal is being examined to generate the same quantum of power in two power houses instead of one.

The first two stages of the Kundah Project could be taken up only because of Canadian assistance to the extent of Rs 12.5 crores which will cover the entire foreign exchange cost of this part of the project. All the power and transmission equipment and the penstocks are being supplied by Canada.

The project has been designed and is being executed directly by the Electricity Department of the Madras Government. Work is progressing satisfactorily and is abreast of schedule. Part of the work is being done departmentally but much of it has been given out on contract.

The dams across the Avalanche and Emerald rivers are fairly small and are of masonry. The tunnelling and laying of the penstocks are more difficult. The tunnels are being excavated in sections which are approached from the two ends and through shafts thrust into the rock from the top or side of the hill. Pneumatic drills and trolley dumpers are being used. The tunnels will all be fully concrete-lined.

Tunnelling is not a novelty in power or irrigation projects. The river Periyar which flows west, through Kerala, was dammed many years ago and diverted east into the Vaigai river through a tunnel. The head

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STAGE — III — (Under investigation)
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Additional storage — 2 700 million cubic feet
Link storage tunnels — 63 000 feet (approx)
Power Tunnel — 30 000 feet (approx)
Power — 135 000 kw

OVERALL — Storage — 11 150 million cubic feet
Tunnels — 25 miles (approx)
Power — 315 000 kw

campus. Twenty per cent of them have been able to attend the institute only with the assistance of Government scholarships

Particular emphasis is laid on practical work and extension activity in the neighbouring villages The principle of "dirty hands" is encouraged and rightly so The engineers have a workshop where they learn and develop skills in carpentry, smithy work, machining and electrical and mechanical engineering Small electric motors and parts of textile machinery are also being manufactured here At a lower level, the Vidyalaya runs an artisan course in general mechanics which is recognised by the Madras Government

The agriculture students are given a basic theoretical grounding which is supplemented by frequent extension activity both in the institute's farm and in the neighbouring villages The College of Rural Higher Education awards a diploma in rural services and social education. Here again, considerable stress is laid on extension activity which includes various social surveys

The Vidyalaya runs a primary, middle and high school, a teacher's college, a basic training school, a college of physical education, a social education organisers' training centre and a rural dispensary. All sections of the Vidyalaya participate in a variety of extension work which is co-ordinated and directed by a rural service officer The students have a van, a jeep and cycles or go on foot and visit selected villages where they assist the peasants in digging soak pits and manure pits, constructing smokeless choolas, building and repairing roads, running kitchen gardens, organising youth clubs, recreation centres, discussion groups and film-shows, building schools distributing milk to children and organising village surveys. Government aid has also been secured for starting poultry farms, purchase of a stud bull and improved goats and for building a small Harijan colony and an adivasi colony in two villages

A Vigyan Mandir, sponsored by the Government, is located in a part of the rural dispensary The objective of the Vigyan Mandirs is to function as rural laboratories and bring science to the villager by soil and water analysis, clinical and pathological work and identification of crop pests This is a very laudable purpose but it has not been quite achieved at the Sri Ramakrishna Vidyalaya Vigyan Mandir.

The Vigyan Mandir is staffed by two Natural History graduates and a laboratory assistant earnest young men who are anxious to do good but who find that no one will allow them to be useful I was shown the herbarium and socio-economic survey sheets of 100 villages All the local crop pests have been studied and the corresponding protective measures annotated The snakes of the area have been classified into poisonous and non poisonous varieties and visitors to the three-case museum maintained at the Vigyan Mandir are instructed in recognising non-poisonous snakes instead of superstitiously fearing them as they normally do

The benefits of this activity do not reach down sufficiently into the villages for many reasons The Vigyan Mandir has no transport of any kind and its officers are, therefore relatively immobile No extension work appears to have been permitted in any case as the other agencies in the field, such as the [illegible] [illegible] ed—or so I was [illegible] [illegible] led The socio- [illegible] Vigyan Mandir

(drop) from this project is now being harnessed by the Madras Government to generate 105,000 kilowatts in the first stage Construction is in progress The Koyna project in Bombay also entails the excavation of a power tunnel But in no other project has tunnelling been so extensively employed as in the Kundah scheme

The Madras grid will have an installed capacity of about 578 000 kilowatts by the end of the Second Plan with the prospect of an additional 250 000 kilowatts by 1962 63 when the Neyveli Thermal Station is commissioned This might appear a gigantic increase within the space of a few years But such is the tempo of development that this power supply will itself stimulate, that many more projects will have to be taken up if the wheels of industry are to be kept moving and power supplied to electrify the countryside

KUNDAH, *February 5, 1959*

A RURAL UNIVERSITY

A FEW miles out of Coimbatore, an interesting experiment is being conducted in developing a Rural Institute which, in standards, would approximate to a junior university The Sri Ramakrishna Mission Vidyalaya is located 11 miles out of the city, in the village of Perianaickanpalayam, at the foot of the Nilgiri Hills Although founded some 30 years ago, it was only recently that the Vidyalaya became a Rural Institute

A few years ago the Government of India appointed a committee on rural higher education which recommended the establishment of institutions for higher education suited to the needs of the rural areas About ten rural institutes have since been started of which one is located at the Sri Ramakrishna Vidyalaya The National Council for Rural Higher Education awards diplomas and certificates for courses conducted at these institutes and they are recognised by the Government of India and the State Governments for purposes of employment especially in the community projects and the co-operative movement

The Rural Institute at the Sri Ramakrishna Vidyalaya consists of three wings, a School of Agriculture, a School of Engineering and a College of Rural Higher Education The first batch of students will be graduating this year The institute has a fine spacious campus with simple but well equipped buildings Its purpose is to educate rural students in a rural curriculum in rural surroundings The idea is to integrate higher education with rural needs and a rural environment so that those who qualify from the institute can serve the rural areas with knowledge and understanding

It is perhaps too early to pronounce on the success of the experiment But it is a worthwhile experiment and there is no reason to believe that it will fail The atmosphere I sensed at the Sri Ramakrishna Vidyalaya and the human material I saw there were both heartening The strength of the institute is not large and most of the students live on the

..se mushrooms is being distributed on a large scale The Chemistry Sect. n has conducted soil surveys and has instituted a rapid soil testing service which is widely availed of by cultivators for advice regarding the fertiliser schedules that should be adopted by them

The Agricultural Meteorology section has marked out agricultural zones according to the rainfall pattern This section is associated with the All India Crop Weather Scheme and has helped to minimise crop losses due to sudden and unexpected changes in weather The possibility of predicting the outbreak of plant diseases and the incidence of pests from a knowledge of weather conditions is also being explored Certain leaf-spot diseases on cotton in the Coimbatore area for example generally occur under humid conditions

Finally the Research Engineering section of the Agricultural College has been able to develop a number of very simple but effective agricultural implem... These in- ... puddlers, ... usker and ... ...ted sheller

Agricultural research holds the key to prosperity in rural India. But extension workers are needed to carry the lessons of research to the ... the knowledge but ... e dedicated to their ... to serve In Coim- ... ...ence of a happy combination The Agricultural College, the nearby Rural Institute and the Vigyan Mandir (provided it is made to function) can banish *poverty* squalor, disease, ignorance and superstition from the villages of India

COIMBATORE *February 6, 1959*

PUBLIC ENTERPRISE

THE city of Bangalore boasts the largest concentration of industrial undertakings in the public sector anywhere in the country The four projects located here present a very varied picture Two civil plants, Hindustan Machine Tools and Indian *Telephone Industries* have both exceeded their original targets and are rapidly forging ahead Output has increased production has been diversified high standards *of quality* have been attained and prices have been steadily lowered

Of the two defence plants Hindustan Aircraft is tooling up to manufacture Gnat jet fighters and Orpheus aero-engines and the first Bangalore built aircraft of this type should be in air by the end of next year Bharat Electronics on the other hand, is unfortunately still trying to get effectively started and has yet to decide on a suitable range and pattern of production.

A visit to ... look of ... There

At the moment, therefore the Vigyan Mandir presents a rather disappointing picture It is no use spending money on these institutions unless they serve a clear and useful purpose and their activities can be and are integrated with the life of the community This matter calls for the attention of the Central and State Governments

The Rural Institute and the Vigyan Mandir are spokes in a wheel of progress in agriculture and rural living standards The wheel will not travel very far unless it gains the momentum that can be given to it by continuous agricultural research in all its aspects Coimbatore is very fortunate in this respect in being the location of one of the premier agricultural colleges in the country where valuable research has been conducted for over 50 years A visit to the college museum is a rich experience It shows at a glance how much improvement is possible through relatively simple and inexpensive means that have been scientifically evolved and proved not merely in the laboratory but in demonstration fields as well For instance 72 superior strains of paddy have been evolved Each has a different property or is suited to a particular type of soil Some [illegible] are immune to floods Still others are proof [illegible] blast Some germinate early All these varie- [illegible] the various plant breeding and agricultural stations of the Madras Government and made available for general distribution

More than 50 per cent of the area under paddy in the State is under improved seed Yields are naturally much higher Similarly 95 per cent of the area under sugar-cane is under improved crop Fifty per cent of the area under millets and 80 per cent of the area under irrigated cotton are also growing improved varieties Hybridisation experiments have been conducted and certain stabilised hybrids evolved Hybridisation entails crossing different varieties to get hybrid vigour and higher yields. An ordinary hybrid seed loses its properties in one or two generations So hybrids of eight families have been crossed in some cases to give a stabilised hybrid whose superior qualities are sustained over many years An outstanding jowar hybrid selection has been evolved which gives a yield of 6 200 lbs per acre (under irrigation) as against normal yields of about 2 000 lbs from local varieties This particular hybrid combines high grain yields with a very short duration germination of 90 days and has juicy stalks which make ideal fodder for cattle This strain has already been spread over 200 000 acres in the State

Similar work has been done in respect of cotton and the world's finest cotton the Sea Island variety has been successfully introduced in Malabar which now forms part of Kerala Cocoa has also been introduced and is being developed in suitable regions in order to permit the establishment of a stable cocoa industry in the country Improved varieties of fruit and vegetables have been experimented upon and propagated

In the field of entomology fundamental studies have been conducted on the life-history of various insect pests based on which a highly effective system of plant protection has been developed It has also been possible to evolve methods for the utilisation of useful pests and parasites for the biological control of other vicious varieties that are responsible for coconut diseases and prickly pear The Plant Pathology Section has done good work in controlling diseases with a bacterial origin and has demonstrated a successful technique of growing edible mushrooms Spawn for raising

these mushrooms is being distributed on a large scale. The Chemistry

a knowledge of weather conditions is also being explored. Certain leaf-spot diseases on cotton in the Coimbatore area, for example, generally occur under humid conditions.

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Of the two defence plants, Hindustan Aircraft is tooling up to manufacture Gnat jet-fighters and Orpheus aero-engines and the first Bangalore-built aircraft of this type should be in air by the end of next year. Bharat Electronics, on the other hand, is unfortunately still trying to get effectively started and has yet to decide on a suitable range and pattern of production.

A visit to Bharat Electronics is a sad experience. It has the look of a large university during vacations—huge, elegant, empty buildings. There

is perhaps more space in Bharat Electronics than at either H M T or I T I, but at least half of it is absolutely empty And of the equipment that has been installed, nearly half is lying idle There is no work for these machines

The whole project has been badly planned A French firm, C S F., were appointed technical advisers on a ten-year contract, signed in 1952. The factory was conceived for an annual outturn of Rs 4 crores Production commenced in the latter half of 1956 and up to date, the plant has been equipped for an output of nearly Rs 1 5 crores But, in fact, the value of production in 1957-58 was only of the order of Rs 26 lakhs It is hoped to double this during the current financial year

The objectives of the project were to design develop and progressively manufacture electric equipment and radar and specialised electronic components, including valves Production was to be geared more especially to defence requirements Radio receivers and household equipment were excluded from its schedule The results have, however, been disappointing The armed forces do not appear to be in a position to place large orders, while Bharat Electronics in its turn, has pleaded a very small quantum of demand for a variety of specialised items, together with foreign exchange and personnel difficulties as reasons for its meagre turn-over and high overheads

The present management of the company has inherited an unenviable legacy of muddle Efforts are now being made to remedy this state of affairs and the possibilities of taking up a number of new and more marketable lines of production such as the manufacture of radio valves x-ray and diathermic equipment, radar equipment and sound tape and tape-recorders are being explored It will, nonetheless, take up to 18 months or more for production to commence after the date of taking a firm decision regarding any of these subsidiary projects which are still "under active consideration" No further delay should be permitted in getting the plant into full production and the Board of Directors must take energetic steps towards this end Bharat Electronics has considerable potentialities which need to be exploited.

Hindustan Aircraft has developed progressively since its establishment, nearly 20 years ago as a private venture With the outbreak of war, the plant became a major Air Force overhaul and repair base and was taken over by the Government It was during these years that the men gained their initial experience in aircraft technology Since then further experience has been gained in the overhaul of various types of aero-engines and H A L first assembled and then fabricated Vampire jet-fighters for the Indian Air Force

It is with this background that H A.L. has contracted a licence agreement for the manufacture of Folland Gnat jet fighters and Bristol Orpheus engines Meanwhile, the Design and Development Division of H.A.L has been strengthened under the direction of a well known German expert, Dr Kurt Tank H A L has already designed and built H T-2 trainers and, more recently, the Pushpak, another training aircraft

The Dakotas now being used by the Indian Airlines Corporation and the I A F will shortly be due for replacement The Government is considering a proposal for the manufacture of civil and military transport aircraft within the country This new capacity is also likely to be located at H.A.L.

The aircraft industry requires light-alloy castings and forgings for which capacity has been set up at H.A.L. The foundry is being further expanded. Aluminium and magnesium alloys are also being made in the works.

In order to balance its production, H.A.L. is making all-metal rail coaches, designed on aircraft construction principles, as well as all-metal bus-body kits.

The aircraft industry calls for precision work and among the precision equipment installed at H.A.L. are a number of lathes manufactured by Hindustan Machine Tools.

The machine tool industry is a very important one, because it produces machines that are required by other industries. At the commencement of the First Five-Year Plan India's [illegible] *tools were of the order of* [illegible] *steadily gone up with the* [illegible] *the country's requirement w*[illegible] *the same period, the value c*[illegible] *risen from Rs 28 lakhs to R*[illegible] *comes from H.M.T.*

H.M.T. went into production about six years ago and had not gone beyond a hesitant start until its present Managing Director, Mr. M. K. Mathulla, took over. Since then production has shot up with [illegible] shift [illegible] The o[illegible] 1956 [illegible] to att[illegible] This t[illegible] of mach[illegible] years ahead of schedule and the output [illegible] was 100 units. At the same time, the [illegible] which [illegible] India of [illegible] was reduced to Rs. 36,000 in Jun[illegible] was further reduced to Rs. 29,500. The prices of the newer lines of production, namely, milling machines and radial drills, may be expected to be similarly lowered. An incentive scheme has been introduced, provident fund contributions have been enhanced to 8-1|3 per cent and profits have increased.

H.M.T. has also pioneered the principle of workers' participation in management in the public sector. [illegible]

[illegible] of the company, marketing conditions, [illegible] to the general economic programmes, the organisation of the undertaking, the production and sales balance-sheet and expansion plans. The Council is further entrusted with the entire responsibility of administering welfare measures and working schedules. But it is precluded from discussing matters relating to wages and bonus which are regarded as proper subjects for collective bargaining.

It is too early to say how the Joint Council has operated, but it is a bold experiment which has, perhaps, already succeeded in creating a new atmosphere of mutual understanding and partnership as between labour and management. The joint operation of the canteen has produced

is perhaps more space in Bharat Electronics than at either HMT or ITI, but at least half of it is absolutely empty. And of the equipment that has been installed, nearly half is lying idle. There is no work for these machines.

The whole project has been badly planned. A French firm, CSF, were appointed technical advisers on a ten-year contract, signed in 1952. The factory was conceived for an annual outturn of Rs. 4 crores. Production commenced in the latter half of 1956 and, up to date, the plant has been equipped for an output of nearly Rs. 1.5 crores. But, in fact, the value of production in 1957-58 was only of the order of Rs. 25 lakhs. It is hoped to double this during the current financial year.

The objectives of the project were to design, develop and progressively manufacture electric equipment and radar and specialised electronic components, including valves. Production was to be geared more especially to defence requirements. Radio receivers and household equipment were excluded from its schedule. The results have, however, been disappointing. The armed forces do not appear to be in a position to place large orders, while Bharat Electronics in its turn, has pleaded a very small quantum of demand for a variety of specialised items, together with foreign exchange and personnel difficulties as reasons for its meagre turnover and high overheads.

The present management of the company has inherited an unenviable legacy of muddle. Efforts are now being made to remedy this state of affairs and the possibilities of taking up a number of new and more marketable lines of production such as the manufacture of radio valves, X-ray and diathermic equipment, radar equipment and sound-tape and tape recorders are being explored. It will, nonetheless, take up to 18 months or more for production to commence after the date of taking a firm decision regarding any of these subsidiary projects which are still "under active consideration". No further delay should be permitted in getting the plant into full production and the Board of Directors must take energetic steps towards this end. Bharat Electronics has considerable potentialities which need to be exploited.

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to attain a rate of production of 400 machines per annum by 1960 61 This target was exceeded three years ahead of [illegible] and the output [illegible] same time the [illegible] at Rs 39 000 [illegible] reduced to Rs 36 000 in June 1957 [illegible] Swiss machine of Rs [illegible] was further reduced to Rs 29,500 The prices of the newer lines of production, namely, *milling* machines and radial drills may be expected to be similarly lowered. An incentive scheme has been introduced provident fund contributions have been enhanced to 8-1|3 per cent and profits have increased.

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The present management of the company has inherited an unenviable legacy of muddle Efforts are now being made to remedy this state of affairs and the possibilities of taking up a number of new and more marketable lines of production such as the manufacture of radio valves x-ray and diathermic equipment, radar equipment and sound-tape and tape recorders are being explored It will, nonetheless, take up to 18 months or more for production to commence after the date of taking a firm decision regarding any of these subsidiary projects which are still "under active consideration" No further delay should be permitted in getting the plant into full production and the Board of Directors must take energetic steps towards this end Bharat Electronics has considerable potentialities which need to be exploited.

Hindustan Aircraft has developed progressively since its establishment nearly 20 years ago, as a private venture With the outbreak of war, the plant became a major Air Force overhaul and repair base and was taken over by the Government It was during these years that the men gained their initial experience in aircraft technology Since then further experience has been gained in the overhaul of various types of aero-engines and H A L first assembled and then fabricated Vampire jet-fighters for the Indian Air Force

It is with this background that H.A L has contracted a licence agreement for the manufacture of Folland Gnat jet-fighters and Bristol Orpheus engines Meanwhile, the Design and Development Division of H.A.L. has been strengthened under the direction of a well known German expert, Dr Kurt Tank. H A L has already designed and built H T 2 trainers and, more recently, the Pushpak, another training aircraft

The Dakotas now being used by the Indian Airlines Corporation and the I A.F will shortly be due for replacement The Government is considering a proposal for the manufacture of civil and military transport aircraft within the country This new capacity is also likely to be located at H.A.L.

A visitor to I.T.I. between 2.45 p.m. and 3.30 p.m. might be surprised to hear music as he went round the plant. [illegible] is a new experiment in music [illegible] is allowed in order to [illegible] selected by the Workers' [illegible], the general preference [illegible] workers are given free [illegible] operations are entitled [illegible], perhaps, begun to enjoy [illegible]

BANGALORE, *February 7, 1959*

LESSONS IN IRRIGATION

THE Tungabhadra Project is a unique model of both what should be done and what should not be done in planning and developing a major scheme of this kind.

It has [illegible] ing that has led [illegible] ew people, how- [illegible] of the irrigated [illegible] and attention to [illegible] be studied and adapted by all States that have undertaken large irrigation schemes.

Tungabhadra has strikingly demonstrated the fact that more often than not a river valley project begins rather than ends with the completion of the dam and canals and that it affords striking opportunity for moulding rural economy and society along new and better lines. It is not adequately realised that the introduction of irrigation can and should mean a virtual agricultural revolution. Many complex problems of deep human significance arise that have to be tackled with knowledge and understanding.

Tungabhadra has suffered many vicissitudes. The project was first conceived about half a century ago. It was taken up just before independence as a joint venture by the Madras and Hyderabad Governments. With the formation of Andhra in 1954, that part of Bellary [illegible] which the dam is located was [illegible]

[illegible] to suffer from the [illegible] has left its mark on the project which [illegible] public interest and administration as between two authorities in [illegible] the Andhra Government and the Tungabhadra Control Board. The problems of completing the Tungabhadra Project and developing the [illegible] (the irrigated area) are difficult enough without being further [illegible] by these political factors. most absurd and artificial divisions of power,

quick results Earlier losses have been wiped out, divided-arrears have been declared for the past four years and the wages of the canteen staff have been more than doubled.

H.M.T. has also broken new ground in collaboration with the Small-Scale Industries Corporation in assisting enterprising workers from its own plant to purchase machine tools on the hire-purchase system for the establishment of small ancillary units adjacent to the factory The company has offered power and water facilities and has placed orders on these small producers and helped them with free technical advice and arrangements for the supply of raw materials It is H.M.T.'s intention to get an increasing volume of smaller parts and components from these ancillary units and to encourage the latter by guaranteeing them an assured market.

Indian Telephone Industries can show an equally fine record of production and a high standard of labour welfare Indigenous production of telephones commenced in 1954 and in five years since then, output has been almost doubled while costs have been cut by over a third. The Posts and Telegraph Department is a monopoly buyer and purchases instruments on the basis of a certain price formula The output of telephones this year is expected to be 84,000 units although I.T.I. has a much bigger capacity But larger production is ruled out as the P & T budget is limited and does not permit of more than a limited offtake This year, for example, the P & T Department is expected to take only 64,000 units and supply the balance to the Railways, defence forces and private subscribers who have been sanctioned small exchanges

Telephones are, however, not the only line of production I.T.I. makes automatic exchange equipment and transmission equipment. Further diversification of production is planned in order to utilise existing capacity Production of traffic-lights has been taken up and the manufacture of railway signal control equipment is under consideration Some job-work is being done and a contract has been secured for the manufacture of calculating and tabulating machine parts that have hitherto been imported.

I.T.I. could perhaps find export markets but, like H.M.T., is debarred from direct sales in all but a few countries for stipulated periods under the terms of its contract with its foreign associate

An incentive scheme introduced in the plant has yielded very encouraging results and a ten per cent increase in production has been realised without any change in methods A Works Committee, with advisory functions, has been in existence for several years and it is now proposed to constitute a Joint Workers' Council Its scope will be wider and it will be consulted on matters pertaining to amenities, service conditions, methods of production, safety measures, incentives and training Unlike in H.M.T., the I.T.I. workers would like to include the grievance machinery within the ambit of the Council This matter has not yet been decided. The Joint Workers' Council will be an intermediate stage between the existing Works Committee and the H.M.T. Joint Management Council.

Like most large plants in the public and private sectors, I.T.I. has a suggestion box regarding machine improvements and new methods Some excellent suggestions have been received and one very useful labour-saving machine has been invented Awards up to Rs 100 have been given in the past and the company is now thinking of instituting special awards of up to Rs 1,000

A visitor to ITI between 2.45 p.m. and 3.30 p.m. might be surprised to hear music as he went round the plant. This is a new experiment in [illegible] umental music is allowed in order to [illegible] records are selected by the Workers' [illegible] Oddly enough, the general preference is for light western music. The evening shift workers are given free buns and tea while persons engaged in hazardous operations are entitled to a free glass of milk. Some workers have, perhaps, begun to enjoy hazardous operations.

BANGALORE, *February 7, 1959*

LESSONS IN IRRIGATION

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This political metamorphosis has left its mark *on the* project which continues to suffer from the most absurd and artificial divisions of power, responsibility, interest and administration as between two authorities in [illegible] the Andhra Government and the Tungabhadra Control Board. The problems of completing the Tungabhadra Project and developing the [illegible] (the irrigated area) are difficult enough without being further [illegible] by these political factors.

The project was also badly planned in the initial stages and this again can be at least partly traced to political uncertainties and administrative change Canal construction was not taken up simultaneously with the dam and when the main canals were commenced, work on the branch canals and distributaries lagged behind. Even today, a section of the Left Bank Canal cannot be constructed in the middle reaches because its alignment has not yet been determined The proposed High Level Canal on the right bank, which is intended to irrigate 500,000 acres is still under consideration. Availability of finance is holding up sanction

The result of all this is that the dam, completed in 1953 54, has enough storage to irrigate about 1 200 000 acres But in fact, even as late as the last season (December), actual irrigation on both sides of the river was limited to 120 000 acres The Left Bank Canal, for instance is intended to irrigate 580 000 acres in the Raichur District of Mysore But as of December, 1958, the main canal had been built to a continuous length capable of irrigating only 250 000 acres Distributaries were however, ready for barely 100,000 acres while a mere 40,000 acres were actually irrigated

Although much of this waste can be attributed to a wholly unrealistic construction schedule for the various categories of canals which have failed to dovetail, this is by no means the only reason There have been other genuine difficulties in developing irrigation in an area where wet farming has been practically unknown The steps now being taken to overcome these problem constitute a fine piece of planning which will in due course bring in some very solid and worthwhile results

Among the lesser, technical difficulties is the fact that canals in the black cotton soil zones, such as in Raichur and Bellary, take up to two seasons to stabilise The water has therefore, to be let down gradually and in limited quantities if the danger of heavy scouring and consequent damage to the canal and its alignment is to be avoided Some of the areas coming under wet cultivation for the first time have also had to be mechanically levelled and deep-ploughed with bulldozers and tractors. Perhaps this too is an eventuality that might have been foreseen Reclamation work is, however now in progress wherever required and about 9 000 acres have been tractorised

The human problems have been far more complex and call for painstaking solutions The first point to be noted is that the districts of Raichur, Bellary and Kurnool have been chronic scarcity areas where [illegible] nknown The introduction of irrigation [illegible] crop patterns and new methods of farm- [illegible] 'es a radical reorientation of the way of [illegible] to be inculcated with a different attitude

TUNGABHADRA PROJECT

DAM:		BENEFITS:	
Type	— Masonry	Irrigation	Stage I — 830 000 acres
Length	— 7 942 feet		Stage II — (with High Level Canal) — 1.2 million acres
Height	— 162 feet	Power	— 99 000 kw
RESERVOIR:		Navigation	— 100 miles on Left Bank Canal
Storage	— 3.05 million acre feet		
Waterspread	— 145 square miles		
COST (Stage I)	— Rs 60 crores		

Irrigation also requires a far more intensive effort on the part of the farmer The problem in the Tungabhadra area, however, is that these districts have been denuded of some of their former population through distress migration over several decades and there is today a real insufficiency of both man-power and bullock-power for intensive cultivation. Schemes are being evolved to import and settle additional labour from other areas of Mysore and from Andhra on reasonably attractive terms and some families have, in fact, already arrived Steps are also being taken to import cattle and upgrade local herds.

The average size of holdings in the Tungabhadra [illegible] 10 to 15 acres on both [illegible] as the p[illegible] bullock [illegible] resources for intensive cultivati[illegible] fields. Steps have, therefore, to be taken to organise the requisite credit. A proposal has also been made that betterment levies should be realised in the form of land in order to reduce the holdings to units of more manageable size.

These are among the problems that have had to be faced. And the systematic steps now being taken to solve them merit study Within Mysore, the Government has designated the Commissioner of Gulbarga Division as Administrator of the Raichur sector of the project. Similarly, the Collector of Bellary has been nominated Special Officer for the development of the project area in that district Both the[illegible] officers exercise general powers of direction [illegible] [illegible]nes and the local department[illegible] On the Raichur s[illegible] a consolidated budget w[illegible] [illegible]nment after scrutiny by the Administrator an[illegible] approval by the Tungabhadra Advisory Board, a body of officials and non-officials

The Administrator (Raichur) and the Spe[illegible] by now declared the areas and pattern of [illegible] optimum development of the ayacut Th[illegible] marked out the actually irrigable areas within the region of command The soil experts then went over every piece of ground and prepared a detailed soil-classification according to the type of soil—black cotton or red laterite—and its depth. On the basis of this information, they worked out the most suitable crop pattern within the three broad categories of wet cultivation (paddy), perennial irrigation (sugarcane) and light, protective irrigation for dry farming (for such crops as cotton, groundnut, jowar, gram and green manures)

Thus, of the 660 000 acres to be irrigated in Raichur and Bellary Districts, about 80,000 acres have been localised for paddy (wet), 30,000 for sugarcane (perennial) and the remaining 550,000 acres for light irrigation (dry farming) The intensities of irrigation are 50 acres per cusec for wet, 60 acres per cusec for perennial and 160 acres per cusec for dry farming The bulk of the ayacut has been localised for light irrigation as the project is primarily a protective scheme designed to provide insurance against failure of the rains. Protective irrigation has therefore been extended to as large an area as possible But whereas irrigation has been provided over a compact block in the Raichur District, the areas localised for irrigation in Bellary have been scattered as the availability of water is disproportionate to the irrigable area. Each of the 122 villages falling

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The human problems have been far more complex and call for painstaking solutions The first point to be noted is that the districts of Raichur, Bellary and Kurnool have been chronic scarcity areas where irrigation has been virtually unknown The introduction of irrigation necessitates a complete change in crop patterns and new methods of farming In other words, it postulates a radical reorientation of the way of life of the ryot The peasant has to be inculcated with a different attitude

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The average size of holdings in the Tungabhadra area varies from 10 to 15 acres on both sides of the river This presents another problem as the peasants find that quite apart from inadequacies of man power and bullock power, they do not have the necessary resources for intensive cultivation of these fields Steps have, therefore, to be taken to organise the requisite credit A proposal has also been made that betterment levies should be realised in the form of land in order to reduce the holdings to units of more manageable size.

These are among the problems that have had to be faced. And the systematic steps now being taken to solve them merit study Within Mysore, the Government has designated the Commissioner of Gulbarga Division as Administrator of the Raichur sector of the project. Similarly, the Collector of Bellary has been nominated Special Officer for the development of the project area in that district Both these officers exercise general powers of direction over all development schemes and the local departmental officials responsible for implementing them. On the Raichur side all departmental expenditures are shown in a consolidated budget which is submitted to Government after scrutiny by the Administrator and approval by the Tungabhadra Advisory Board, a body of officials and non-officials

The Administrator (Raichur) and the Special Officer (Bellary) have by now declared the areas and pattern of 'localisation', a basic step towards optimum development of the *ayacut* The engineers first marked out the actually irrigable areas within the region of command The soil experts then went over every piece of ground and prepared a detailed soil-classification according to the type of soil—black cotton or red laterite—and its depth. On the basis of this information, they worked out the most suitable crop pattern within the three broad categories of wet cultivation (paddy), perennial irrigation (sugarcane) and light protective irrigation for dry farming (for such crops as cotton groundnut, jowar, gram and green manures)

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within the commanded area has therefore been given a limited share of irrigation.

The branch and distributary canals and the field channels have been aligned and designed in accordance with the pattern of localisation. All channels down to a capacity of one cusec are the responsibility of the project.

The localisation pattern has created numerous local discontents. In the Bellary tracts, irate villagers outside the localised areas want to know why they have been excluded when water is flowing past their fields into the fields of their neighbours. This is not easy to answer. On the other hand, peasants within the localised areas believe that irrigation means, or should mean, wet or perennial irrigation. It takes a great deal of patience and demonstration to convince them that the mere irrigation of dry crops can increase yields by 100 per cent while the addition of fertilisers can raise yields by as much as 400 per cent or even more in some cases. They have to be educated in the advantages of dry farming in terms of the relatively lower labour input and cost as compared with wet cultivation. But prejudices die hard.

So, while in the first years the administrators had seen water flowing through the fields unused, they now find cultivators cutting the bunds to tap water outside the localised areas or growing crops other than those prescribed under the localisation scheme. The localisation pattern has the sanction of law and offenders can and have been punished. But the administrators are conscious of the fact that they are dealing with a human problem and have accordingly exercised tact and patience in handling the situation.

As is usual in most parts of the country, the ryots have generally responded to demonstrations of dry and wet farming that have clearly brought home the benefits of improved seed, manuring, regulated irrigation, levelling, contour bunding, use of improved implements and other improved agricultural practices. These demonstrations have been conducted both on project farms, to which the ryots are taken for periodic visits, as well as in the fields of individual farmers in the villages. The money spent on such demonstration activity more than pays itself in the encouraging response it evokes in favour of better farming The entire area of the developed *ayacut* is under improved seed and no one thinks of growing paddy without ammonium sulphate

Development calls for finance which should really be regarded as part of the project expenditure Otherwise, the normal administrative budget is seldom sufficient for developing the *ayacut* and, therefore, in the long run, really entails loss of revenue to the state in delaying the returns that the project is expected to give It is in recognition of this fact that the Planning Commission has allotted a sum of Rs 2 5 crores for the development of the Raichur *ayacut* during the Second Plan period.

Mere pumping in of money from outside without inviting the participation of the local people to invest in the development of their own lands will not yield permanent results. At the same time, the Tungabhadra area has been impoverished by generations of famine and scarcity The ryots, in many areas, have already been saturated with *taccavi* loans and are heavily in debt.

In Raichur, however, the Government has been advancing *taccavi* quite liberally at the rate of Rs. 300 per acre for land localised for sugar-

cane and Rs 200 and Rs 100 per acre for lands localised for paddy and light irrigation respectively The project Administrator has simultaneously tried to divert part of this amount for the formation of co-operative societies

ayacut have been organised in 74 societies

Another interesting point that exp

f the sugarcane economy ctory in the neighbouring taluk of Gangawati has put sugarcane cultivators *to actual loss* Similarly, it *is felt that the area localised for cotton in Bellary will not be* developed rapidly unless a *spinning mill is established in that region.*

The development of the *ayacut* entails close attention to every aspect of the economy Market gardening, horticulture and pisiculture are being introduced. A good *cattle-cum-sheep breeding farm has been* established. The roads, which were formerly on low ground, have now to be realigned on higher ground and *in addition made pucca with the intro*duction of irrigation. *This is an urgent need as facility* of communications is imperative for easy marketing which, in turn, stimulates agriculture

Whatever its past sins the T *today humming* with activity become a vast laboratory for rural development.

HOSPET, *February 8, 1959*

TOMORROW'S FIREWOOD

THE per capita consumption of energy in India is only a twelfth of that in the United Kingdom and only a twenty-fourth part of that in the United States. This comparison is less flattering *when it is realised* that about 73 per cent of the total energy consumption of this country is provided by burning animal dung If India is to prosper, it must augment its energy supplies and generate this power from more efficient sources

The Atomic Energy Establishment is trying to assist in this process and as a first step has launched on "Project Firewood." I was shown

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some of this new firewood at Trombay A young atomic engineer took *it out reverently* [illegible] for *my inspection. It* [illegible] first *to be produced in the* [illegible] *and built at Trombay.*

This uranium ingot, and the others that follow, will provide the *the initial programme of atomic power generation* that is being [illegible] by 1963 [illegible] The Third [illegible] firms [illegible] establish- [illegible] for the

[illegible] wasteful and extravagant *The average person might think* that it is wasteful and extravagant *for a poor country like India to embark on a programme of* nuclear power *at a time when the most advanced nations* in the world are still trying [illegible] and when all the additional power required [illegible] future can be met from the traditional [illegible] *such idea* would in fact be quite falla-[illegible]

The country's coal resources are really not very plentiful *in terms of high grade coal Moreover, such coal deposits as we have are concentrated in the Jharia-Raniganj* and Central India coalfield belts *except for scattered finds as at Singareni and lignite at Neyveli.* The *hydro-electric potential is far more limited and has recently been* esti*mated to be of the order of about 45 million kilowatts*

As against this, installed power capacity is being sought to be *almost doubled* [illegible] the Second Plan and *it is expected t* [illegible] necessitate a further *doubling of capa* [illegible] tence elsewhere indi*cates that gener* [illegible] itself every 10 years *and there is no reason to suppose* that such a stipulation will not apply *to India during the fourth and subsequent plans*

A projection of power requirements up to the end of the century *on this basis clearly shows* that the day is not far when the entire hydro *potential will have been harnessed* and the economics of coal-fired thermal *stations will become progressively more* unfavourable *especially at loca*-*tions removed from the coalfields* such as Western India In the circum*stances, the gap in the* country's power requirements will increasingly *have to be filled from* some other source This could only be *atomic power.*

Although the technology *of atomic* power is still in its infancy, the *capital cost of generating a* kilowatt of nuclear power even now compares *favourably with* that of thermal or average hydel projects The capital *cost of thermal power* appears to be lower but is not really so if the cost *of mining and transporting* the additional coal is also taken into consi*deration* In respect of operating costs, atomic and hydel power would *both be cheaper* than thermal power based on coal

This little dissertation is necessary to show that even on the basis *of existing technology,* nuclear power would be an economic proposition *in India today.* But the nuclear power programme contemplated during

the next Plan period would, in fact, be more than economic from the long-term point of view. It would be a valuable investment for the future.

This statement also calls for some explanation. The primary atomic fuels are to be found in uranium and thorium India fortunately possesses deposits of both these minerals But whereas the known reserves of better grade uranium are estimated at only about 30,000 tons at present, those of thorium, which is found in the monazite sands of Kerala and more extensively in Bihar, are estimated at about half a million tons

This is no misfortune, for with the development of atomic science it is becoming apparent that the more advanced and economic atomic reactors of the future will utilise plutonium or uranium 233—richer materials than natural uranium—both of which have the extraordinary quality of creating more fissile material than they consume in what is known as a "breeder reactor" Now plutonium can be got as a by-product of an atomic reactor based on natural uranium and this plutonium in its turn can be used to convert thorium into uranium 233

Since the country's resources of natural uranium are not abundant, it would be desirable to base an [illegible] ment of atomic [illegible] op- is precisely th[illegible] It [illegible] the early development of nuclear power from natural uranium so that enough plutonium is "manufactured" in time to undertake a large atomic power programme 10 to 15 years from now. And it is on a cautious appraisal of the country's future power needs that it is felt that the generation of atomic power based on natural uranium must be started immediately so that an adequate plutonium "dividend" will have been earned by the end of the Third Plan period

The relevant calculations place the size of the initial atomic power programme at a million kilowatts Such a programme might entail a capital cost of up to Rs 250 crores This might sound a large amount but it is not much more than would have to be spent on an equivalent thermal programme in any area located some distance away from the coalfields

The uranium "firewood" produced at Trombay will enable us to trigger off an atomic power programme with indigenous fuel elements The fuel element consists of a rod of uranium sandwiched in between two strips of aluminium A small fuel element plant is being built at Trombay for this purpose It will also conduct research in new fuel elements

Fortunately India is well placed for the development of an indigenous atomic [illegible] is already [illegible] ths Limited at Alwaye thorium c[illegible] to produce a uranium-uranium p[illegible] Trombay further refines this thorium-uranium cake into [illegible] "rare earths" The a thorium salt and pure uranium metal.

A nuclear reactor also requires a moderator to contain its own energy production One type of moderator, heavy water, is going to be produced at Nangal as a by-product of the fertiliser plant that is now under construction there Beryllium, another possible moderator, is found in abundance as beryl and a large pilot plant for producing atomically pure beryllium oxide is being designed at Trombay. The Atomic Energy

some of this new firewood at Trombay A young atomic engineer took it out reverently from a special container and held it up admiringly for my inspection It was an ingot of nuclear-pure uranium metal, the first to be produced in the newly run-in uranium processing plant designed and built at Trombay.

This uranium ingot, and the others that follow, will provide the fuel for the initial programme of atomic power generation that is being planned It is proposed to build a 250,000 kilowatt atomic station by 1963 and augment this capacity to a million kilowatts by the end of the Third Five-Year Plan Negotiations are already under way with foreign firms for the supply of plant for the first station The Atomic Energy Establishment is meanwhile engaged in design work that might be useful for the subsequent nuclear power programme

The average person might think that it is wasteful and extravagant for a poor country like India to embark on a programme of nuclear power at a time when the most advanced nations in the world are still trying to develop this new technology and when all the additional power required by the nation in the immediate future can be met from the traditional thermal and hydro sources Any such idea would in fact be quite fallacious and needs to be dispelled

The country's coal resources are really not very plentiful in terms of high grade coal Moreover, such coal deposits as we have are concentrated in the Jharia-Raniganj and Central India coalfield belts except for scattered finds as at Singareni and lignite at Neyveli The hydro-electric potential is far more limited and has recently been estimated to be of the order of about 45 million kilowatts

As against this, installed power capacity is being sought to be almost doubled to about six million kilowatts during the Second Plan and it is expected that the development of loads will necessitate a further doubling of capacity during the Third Plan Experience elsewhere indicates that generating capacity generally doubles itself every 10 years and there is no reason to suppose that such a stipulation will not apply to India during the fourth and subsequent plans

A projection of power requirements up to the end of the century on this basis clearly shows that the day is not far when the entire hydro potential will have been harnessed and the economics of coal-fired thermal stations will become progressively more unfavourable especially at locations removed from the coalfields such as Western India In the circumstances, the gap in the country's power requirements will increasingly have to be filled from some other source This could only be atomic power

Although the technology of atomic power is still in its infancy, the capital cost of generating a kilowatt of nuclear power even now compares favourably with that of thermal or average hydel projects The capital cost of thermal power appears to be lower but is not really so if the cost of mining and transporting the additional coal is also taken into consideration In respect of operating costs, atomic and hydel power would both be cheaper than thermal power based on coal

This little dissertation is necessary to show that even on the basis of existing technology, nuclear power would be an economic proposition in India today But the nuclear power programme contemplated during

the next Plan period would in fact, be more than economic from the long-term point of view It would be a valuable investment for the future

This statement also calls for some explanation The primary atomic fuels are to be found in uranium and thorium India fortunately possesses deposits of both these minerals But whereas the known reserves of better grade uranium are estimated at only about 30,000 tons at present, those of thorium, which is found in the monazite sands of Kerala and more extensively in Bihar, are estimated at about half a million tons

This is no misfortune, for with the development of atomic science it is becoming apparent that the more advanced and economic atomic reactors of the future will utilise plutonium or uranium 233—richer materials than natural uranium—both of which have the extraordinary quality of creating more fissile material than they consume in what is known as a "breeder reactor" Now plutonium can be got as a by-product of an atomic reactor based on natural uranium and this plutonium in its turn can be used to convert thorium into uranium 233

Since the country's resources of natural uranium are not abundant, [illegible] op- [illegible] It [illegible] the [illegible] development of nuclear power from natural uranium so that enough plutonium is 'manufactured' in time to undertake a large atomic power programme 10 to 15 years from now And it is on a cautious appraisal of the country's future power needs that it is felt that the generation of atomic power based on natural uranium must be started immediately so that an adequate plutonium 'dividend' will have been earned by the end of the Third Plan period

The relevant calculations place the size of the initial atomic power programme at a million kilowatts Such a programme might entail a capital cost of up to Rs 250 crores This might sound a large amount but it is not much more than would have to be spent on an equivalent thermal programme in any area located some distance away from the coalfields

The uranium 'firewood' produced at Trombay will enable us to trigger off an atomic power programme with indigenous fuel elements The fuel element consists of a rod of uranium sandwiched in between two strips of aluminium A small fuel element plant is being built at Trombay for this purpose It will also conduct research in new fuel elements

Fortunately India is well placed for the development of an indigenous atomic [illegible] is already [illegible] ths Limited at Alwaye thorium c[illegible] to produce a uranium-uranium p[illegible] [illegible]le 'rare earths" The [illegible] at Trombay further refines this thorium uranium cake into a thorium salt and pure uranium metal

A nuclear reactor also requires a moderator to contain its own energy production. One type of moderator heavy water is going to be produced at Nangal as a by product of the fertiliser plant that is now under construction there Beryllium another possible moderator, is found in abundance as beryl and a large pilot plant for producing atomically pure beryllium oxide is being designed at Trombay The Atomic Energy

Establishment is also considering the erection of a plant to process coke from the Digboi Refinery into atomically pure graphite which is again another moderator

Beryllium and zirconium, a metal extract from zircon, one of the constituents of monazite sand, could both perhaps be used in place of aluminium for encasing nuclear fuel elements

Mere richness in atomic minerals is, however, of little use without the scientific know-how and technology needed for its utilisation. Fortunately again, India has today a very promising team of young scientists and atomic engineers at Trombay who are hard at work in experiment and research

The best instruments of research are reactors and so the Atomic Energy Establishment has built a number of research reactors The first of these, Apsara, attained criticality in August, 1958 It was designed and built entirely at Trombay by Indian personnel. The fuel elements were, however, supplied by the United Kingdom A second reactor, Zerlina, is expected to be ready later this year while a large reactor is being built with Canadian assistance This is expected to go into operation next year and will use as moderator heavy water sold to us by the U S The Canada-India reactor will produce isotopes in bulk and will make them easily available for medical, agricultural and industrial use

The work being done at Trombay is an investment in progress The new 'firewood' will kindle a torch that will light the way ahead

BOMBAY, *February 10, 1959*

CO-OPERATE AND PROSPER

AMUL butter and other milk products marketed under the same brand name have become household words in many thousands of homes throughout the country 'Amul' stands for Anand Milk Union Limited, itself a synonym for the Kaira District Co-operative Milk Producers' Union the headquarters of which are located at Anand, a little town about half way between Baroda and Ahmedabad and close neighbour to the village to which Sardar Patel belonged

Amul butter is the end product of an immensely beneficial and highly organised pattern of co-operative dairying that unites a very well equipped and modern dairy at Anand with as many as 40 000 farmers spread over an area of 1300 square miles around it The development of the Kaira District Co-operative is a fascinating story of economic progress and prosperity through co operation

The base of the Kaira District Co operative Milk Producers' Union is 138 village Milk Producers' Co-operative Societies with a total membership of 40 000 farmers who own about 56 000 buffaloes The individual farmers pay a membership (share) fee of Rs 5 and a registration

fee of one rupee to join the village Society The village Society in turn joins the Union by purchasing Rs 100 worth of shares in it

It was early morning when I visited Kavitha, one of these 138 villages A queue of men and women was gathered outside a clean, *pucca* building This was the Society's milk collection centre and as the members filed past the counter, the Secretary of the co-operative and two assistants measured the milk tipped out of brass pots, tested its quality, entered the particulars in a register and made cash payments for the amount of milk collected The queue moved rapidly Others meanwhile entered to buy milk There was no noise and argument This was business at fair prices that profited everybody Within a few minutes, the milk had been poured into metal containers awaiting transport to Anand some fifteen miles away The Union truck came on its round Half an hour later the milk was in the dairy being pasteurised and processed into butter, milk powder, ghee, condensed milk and casein.

This same cycle is repeated just after sunset when the evening milk collections are made and processed in the plant The 138 village co-operative milk Societies meet their members twice a day

How did it all begin? It was in 1945 that the Bombay Government launched on a scheme for the collection of surplus milk from Anand to supply Bombay city, 266 miles away Initially the scheme was operated through private agencies without benefit to the local farmers This naturally aroused a certain discontent which crystallised in an agitation resulting in the decision to organise the collection and processing of milk in and around Anand on a co-operative basis This is what Sardar Patel had wished

In June 1948 the Kaira District Co-operative made a beginning with processing 500 lbs of milk in an old Government dairy taken over by it Today the new plant at Anand handles about 100 000 lbs of milk a day in summer and over 250 000 lbs of milk a day during the winter months Of this 80 000 to 120 000 lbs of liquid milk are despatched to Bombay every day in insulated rail road tankers—gifted to

KAIRA MILK UNION

Inaugurated		— June 1948
Number of village societies (Jan 1959)		— 138
Membership		— 40 000
Number of buffaloes owned by members		— 56 000
Daily milk collection — summer		— 100 000 lbs (approx)
Daily milk collection — winter		— 250 000 lbs (Approx)
Villages seeking admission		— 60
New Amul Dairy Anand :— Inaugurated		— October 1955
Cost of Plant and Building		— Rs 50 lakhs
Capacity		— 300 000 lbs of milk per day
Turnover (1958 59)		— Rs 2 10 crores
Products — Liquid	Milk	— Rs 95 lakhs
	Butter	— Rs 60 lakhs
	Milk powder	— Rs 30 lakhs
	Ghee	— Rs 13 lakhs
	Condensed Milk	— Rs 10 lakhs
	Casein	— Rs 2 lakhs
Expansion Programme	Baby Food	
	Cheese	
Share capital of Kaira Union		— Rs 4 68 200
Profit in 1957 58		— Rs 10,46,000
Management	Kaira District Co-operative Milk Producers' Union	

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MUD-HOLE AND CHRISTMAS TREE

KHAMBAT or Cambay is a city of some antiquity known for many centuries as a flourishing port and centre of international commerce It was already a declining port when the early Portuguese and Dutch settlers established their factories here in the 16th century and was soon eclipsed by the rise of Surat

Today, the Gulf of Cambay is no more than a narrow tongue of water hemmed in by mud flats that have been filling in the bay. The old prosperity has disappeared. Trade has dwindled and cultivation is poor

Cambay has however ... portance Geological and ... years ago revealed con- ... s opinion was confirmed by a team of Soviet geologists who toured the country in 1956 to assess the data already available with the Government of India regarding possible oil bearing strata

Armed with th ... Gas Com- ... the Cam- ... apacity of ... was installed and drilling commenced on July 26, 1958 at Lunej village about six miles from Cambay By October, the drill hole had reached a depth of about 7,000 feet and penetrated the hard, impervious rock of the Deccan trap Signs of oil and gas had already been noticed and further tests amply confirmed the presence of oil

How much oil is there at Cambay and ... lies? It is too early to say More holes ... the size of the oil field The Lunej rig ... to another site about a mile away whe ... Four more drill sites have been selected around Lunej to develop the field and determine its extent Since oil has been struck at a relatively shallow depth, somewhat smaller rigs are being procured from Rumania and the Soviet Union for the further drilling programme in this area

The process of turbo-drilling followed at Lunej is interesting The 176 foot high derrick still stands sentinel over a bare landscape To operate the drill a special type of clay-mud had to be got from Bhavanagar some 120 miles away The drill is lowered in a casing and a liquid-mud mixture forced into it at high pressure to rotate the drill in much the same way as a head of water is employed in hydro-electric projects to drive the turbines that generate the power In this case, the mud is used not only to work the drill but also to cool it The drill hole at Lunej was 27 inches at the top and narrowed down to just under ten inches at the bottom of the well, 7,000 feet down. This telescoping was achieved by using drill-heads of lesser d... The casing above the drill head ... about 16 inches at the top and ... gap between the drill hole and ... and earth cut out by the drill ... and the ground The mud serves the additional purpose of forcing up the rock cuttings to the surface and, further, of plastering the drill hole in order to prevent it from crumbling

located at Anand. This institution has done valuable work in animal husbandry research and has developed an excellent foundation herd of Kankrej cattle. The Anand peasant keeps cow buffaloes for milk and bulls for draught purposes This is wasteful as the cows and bull buffaloes are of no use except for breeding purposes The Kankrej herd now developed by the Agricultural Institute combines a good draught bull with very productive milch cows with yields that have touched as much as 13,000 lbs It is now proposed to try and introduce cows into the local milk herds This would serve the additional purpose of evening out the variations in the summer and winter milk supply as the cows and buffaloes have different breeding seasons. Stabilisation of the milk supply by these means would be invaluable for the Kaira Union and would facilitate more economic dairy operations

The Agricultural Institute is not an isolated body but is affiliated to the Vallabh Vidyanagar, four miles out of Anand, which has recently been accorded the status of a University. The Vidyanagar is again the product of a dedicated vision of rural regeneration.

The founders of the Vidyanagar believe that if the villages are to prosper they must be made habitable by the intelligentsia and provided with modern amenities and decentralised industries based on power and modern technology. If this is to occur, however, the villages must first be served by men who understand their needs and can feel and understand the aspirations and problems of the villager It is hoped that the Vallabh Vidyanagar, by its rural environment and close association with the rural activities around it, will produce such men and women There is already an Arts and Science college, an engineering college and some other institutions all of which are run by the Charotar Vidya Mandal

An associate body has been established to take care of industrial development It is equipped with a workshop and has launched on a number of industrial enterprises, some of them of a commercial character, such as the design and construction of village waterworks (in 30 villages), the manufacture of pre-stressed concrete poles for power transmission, a cement pipe and tile factory, a foundry and a cable factory Extension work has also been taken up and experiments are being conducted to see whether certain power-based village industries cannot be started if certain preparatory and finishing processes are centrally undertaken and the rest of the operations decentralised

Although they may appear to have little in common, the Kaira Union and the Vallabh Vidyanagar have the same goal—rural upliftment They should work in close collaboration with one another and, given time, will help create a new and happier village society

ANAND, February 11, 1959

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Today, the Gulf of Cambay is no more than a narrow tongue of water hemmed in by mud flats that have been filling in the bay. The old prosperity has disappeared. Trade has dwindled and cultivation is poor

Cambay has, however, acquired a new importance. Geological and geophysical surveys of the area conducted a few years ago revealed conditions favourable for the location of oil This opinion was confirmed by a team of Soviet geologists who toured the country in 1956 to assess the data already available with the Government of India regarding possible oil-bearing strata

Armed with this geological evidence, the Oil and Natural Gas Commission decided to drill [illegible] the Cambay region Accordingly [illegible] apacity of 5000 metres was install[illegible] 6, 1958 at Lunej village about six [illegible] from Cambay By October, the drill hole had reached a depth of about 7,000 feet and penetrated the hard, impervious rock of the Deccan trap Signs of oil and gas had already been noticed and further tests amply confirmed the presence of oil

How much oil is there at Cambay and is it in commercial quantities? It is too early to say More holes will have to be drilled to establish the size of the oil field. The Lunej rig is being dismantled for movement to another site about a mile away where a second well is to be drilled Four more drill sites have been selected around Lunej to develop the field and determine its extent Since oil has been struck at a relatively shallow depth, somewhat smaller rigs are being procured from Rumania and the Soviet Union for the further drilling programme in this area

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as fuel Both these practices rob the land of protective cover and expose it to erosion by the strong south-west winds that blow from February to May. Erosion takes three forms. Fine dust particles are carried suspended in the air over considerable distances; slightly larger particles move by bouncing five to ten feet at a time, and still larger particles are rolled along the ground for short distances under the lash of stronger winds In the latter two processes, the sand particles are deposited wherever they meet any kind of obstruction to form dunes of varying height and extent

Controlling [illegible] wind erosion and adjusting the [illegible] litions of the area The Desert [illegible], undertaken *a programme of research relating to agrostology* (grasslands), silviculture (forests) and agronomy (farming) in desert conditions

If the desert has been created by misuse of pastures by overgrazing the obvious corrective would be to ensure proper management and improvement of the grasslands in future The first criterion, however, must be the realisation that grass is not a mere gift of nature but a crop that must be cultivated as any other agricultural crop It must be seeded and manured and scientifically grazed At present however the desert nomad follows the pasture with his herd and unsparingly feeds his animals on the grasses that sprout after the rains, leaving nothing behind and exposing the bare earth to further erosion There is no rotational grazing Enlarged areas of erosion and marching sand dunes reduce the land under grassland the next season The smaller pasture is grazed more recklessly the following year More erosion ensues This has been the pattern for centuries—shrinking pastures and an expanding desert And man's answer to this challenge has only aggravated the problem As his livestock has deteriorated with the growing degradation of the pastures, he has tried to increase the size of his herd

This then is another problem. The grazier must learn that fewer and better cattle, sheep and other livestock will bring him greater profit than the possession of large numbers of ill-fed animals This is a matter of some importance not only from the point of view of soil conservation but because even today the desert produces some of the best breeds of cattle, sheep, goat, horse and camel in the country The upliftment of these stocks is a matter of national interest Simultaneously, the nomad *must be settled in 'ranches' A new pattern of grass-farming has to be* introduced To this end, the Desert Control Station has started a number of demonstration plots for pasture improvement in various desert development blocks

The role of silvicultural research is to introduce hardy, desert trees that can be planted to provide shelter belts and fix the moving sands It is again a *debatable point whether forests attract rain* but they certainly do help conserve moisture in the soil Trees are also needed for fuel

The Desert Control Station has a small nursery and a larger farm a few miles out of Jodhpur where experiments are being tried out with different types of grass and trees The useful varieties are being multiplied and supplied for demonstration plots and for the development of arboretums (tree gardens). Sections of some of the roads and railway track have also been lined with avenues

The agronomy section of the Desert Control Station is confronted with the problem of abysmally low yields over much of the desert tract through ignorance of dry farming methods Crops are sown on active sand dunes which set them moving Farmers indulge in over-seeding and do not bother about weeding There are also simple techniques of cultivation suited to the desert such as 'wind-strip' farming under which alternate strips of grass and crop are sown The Station has not yet got to the stage of making definite recommendations or carrying out [illegible] nite results must first be estab-

The actual work of extension has for the moment been left to the community development movement and the State agricultural authorities. I visited the village of Bala, 40 miles east of Jodhpur in the Bilara Community Development Block. This is one of the villages that has made good. Agriculture has improved and has been given a further stimulus with the formation of a large scale multi-purpose co-operative society covering five villages in all Bala originally had a co-operative all to itself But a large society in collaboration with the neighbouring villages has been found desirable because of its larger resources A new grain godown has just been completed at Bala, a valuable facility for the local farmers The co-operative embraces 390 of the 600 families in the five villages It advances short-term loans and last year distributed improved seed, fertilisers, improved implements, cement and iron-sheets Bala can also be proud of the strong community sense of its citizens who have contributed as much as Rs 45,000 for various public works as against a Government contribution of Rs 30,000

A few miles from Bala is Jhurli Farm where Prabha Dan has converted 500 bighas of desert waste into an excellent farm. Prabha Dan was in the transport business for some years But he is essentially a villager and decided to invest his money in the land He bought land at Jhurli, reclaimed it with a tractor and drilled down an abandoned well to strike a rich strata of water The entire farm is now irrigated by this single well The field channels have [illegible] serve water The [illegible] nures a fine vege- [illegible] a surprise They [illegible] *gulkand* [illegible] needed an approach road. So [illegible] built himself one along the mile-long slope of country down to his farm. He now proposes to use the burrow-pits he dug to make the road to construct a channel that will drain the entire slope and store the rainwater over a considerable catchment in a depression at the foot of his farm.

Jhurli Farm is a one-man community project "If only there was a co-operative marketing society," Prabha Dan told me, "I would be able to sell milk and vegetables in Jodhpur" Nowadays he sometimes has to throw away vegetables Having tasted his luscious tomatoes, I can fully share his sorrow that good food must go to waste

The Community Development programme has also made an impact in Nokha block, 40 miles south of Bikaner, an oasis on the edge of the

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Controlling the desert largely turns on the prevention of wind erosion and adjusting the pattern of agriculture to the rainfall conditions of the area The Desert Control Station at Jodhpur has, therefore, undertaken a programme of research relating to agrostology (grasslands), silviculture (forests) and agronomy (farming) in desert conditions

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The Desert Control Station has a small nursery and a larger farm a few miles out of Jodhpur where experiments are being tried out with different types of grass and trees The useful varieties are being multiplied and supplied for demonstration plots and for the development of arboretums (tree gardens) Sections of some of the roads and railway track have also been lined with avenues

from now this mirage will be realised The desert nomad will rub his This flowed at the muna s been taken up since Independence A virtually uninhabited sandy waste of 8 000 square miles in the Bikaner and Jaisalmer districts of Rajasthan,

The Rajasthan Canal will perhaps be the largest irrigation canal in the world It will run 425 miles from the Harike barrage, just below the confluence of the Sutlej and Beas in Punjab, to Ramgarh, a tiny hamlet west of the city of Jaisalmer It will be designed to carry a discharge of 18,500 cusecs at the head and 6,000 cusecs in the tail reaches, with a bed width of 134 feet and a depth of 21 feet It is intended to use this canal for navigation and some planners already visualise the day when the canal will be linked to the Jamuna in the north and the River Luni in the south to provide a continuous, navigable channel from Delhi to Kandla

Work has

on and drinking water below known as the Rajasthan Main The work has been let out to a number of contractors and the great waterway has already begun to take shape A small pilot canal is being excavated alongside the main channel to provide water for construction and drinking purposes Progress is a little ahead of schedule at present

The project, as sanctioned, includes the full length of canal and branches and distributaries

More important, the sanctioned project envisages lining of the canal for only 110 miles of the Feeder Lining of the remaining 23 miles of the Feeder has now been accepted

It would be the gravest error of judgment on the part of the Government and people of India if they do not insist, here and now, that the

RAJASTHAN CANAL

STORAGE:
Beas & Ravi Dams (under investigation)
HEADWORKS:
Harike Barrage
CANAL:
Length — 425 miles
Discharge at head — 18,500 cusecs
at tail — 6 000 cusecs
Width — 134 feet
Depth — 21 feet

BENEFITS
Irrigation — 2 6 million acres
Colonisation — about 2.5 million people
Navigation
Power (on branch canals) 10 000 kW
COST
Rs 66.5 crores (at 1955 prices)
PROGRESS:
Non perennial irrigation from 1961
AGENCY:
Rajasthan Canal Board

desert. This is a good sheep breeding district and the Roda village Sheep Breeding Co-operative has all the village sheep-breeders on its roll. The shares are Rs. 11 each and with a share capital of Rs. 2,300 and a Rs. 8,000 loan from the Government, the co-operative has undertaken the marketing of wool and the purchase of improved rams and has constructed a sheep-dip for the prevention of skin diseases. Loans have been advanced for the purchase of fodder and a shearing shed is being built. Formerly the wool used to be bought by Bikaner merchants. Now it is marketed by the co-operative at better prices.

The community development programme has certainly made headway in the two villages I visited. But [illegible] traditions and superstitions linger although [illegible] ange. On the way back from Bala to Jodhp[illegible] across the road with supreme grace. Our d[illegible] jeep to a halt. It was a bad omen that these animals had crossed from left to right. A moment's pause was, therefore, necessary to neutralise any unfortunate consequences.

Again, at Roda, I was informed that one of the 29 rules observed by the local Bishnoi sect forbids the castration of bulls. This prohibition comes in the way of cattle development as scrub bulls cannot be sterilised. The surreptitious castration of bulls by blacksmiths is cruel and dangerous and a village level worker who persuaded a farmer to offer his bull for castration by a simple, modern method was subjected to boycott—*hookah pani bandh*.

In Roda, as in all the other villages of the area, the well is worked 24 hours a day and every day in the year. It never stops and yet there is not enough water. The well rope is made of strong buffalo hide except for the last five or six feet tied to the bucket which touches the water. This piece is of ordinary fibre rope, as buffalo-hide would pollute. Yet the actual bucket or *charas* is made of cow-hide. This is, however, quite proper as the leather has been especially purified and blessed.

The life of the village revolves round the well. A bath is an unheard of luxury. The animals receive a rationed water supply. A stranger or a guest may often be offered milk rather than water which is far more precious, more precious than gold.

BIKANER, *February 15, 1959.*

REALISING A MIRAGE

It is quite common in the desert villages of Rajasthan for people to store rainwater in family 'kunds' which are kept under lock and key. There is no greater treasure. The water table in this arid tract is never above 270 to 350 feet. It may be lower. The water found at these depths is seldom plentiful. It is sometimes brackish and occasionally poisonous.

The boiling summer sands often produce the mirage of cool, blue streams of water—a cruel joke on thirsty men. But in a very few years

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entire main canal and the branches be lined in order to conserve valuable supplies of water that would be lost in unlined channels through seepage and evaporation Lining the 292-mile length of the main canal would cost an additional Rs 16 crores and would conserve 3,000 cusecs of water If the branch canals were lined the further cost and conservation would be Rs 9 crores and 1,500 cusecs respectively.

About 3 4 cusecs of water at the distributary head is required to irrigate a thousand acres On this calculation, a saving of 4,500 cusecs will permit the irrigation of an additional 1 3 million acres or a total of 3 9 million acres which would cover the entire cultivable area commanded by the project Most of this will be from flow irrigation on the right bank of the canal where the land slopes down to the Indo-Pakistan border The higher ground on the left bank will be irrigated by lifting the water from 80 to 100 feet Much of the power needed to lift this water can be generated on the Canal Two falls on the first two branch canals alone will generate 10,000 kw The canal has some additional power potential lower down which could also be exploited

The cost of branch and distributary canals to irrigate an additional 1 3 million acres of land would be about Rs 12 crores Taking this into account, the total cost of lining the main canal and its branches would be of the order of Rs 37 crores As against this, 4,500 cusecs of precious water would be saved to irrigate an additional area of desert The produce of this 1 3 million acres of virgin land might be put at half-a-million tons of food grains per annum and might be valued at over Rs 20 crores This would be only part of a recurring benefit

A lined canal would not merely reduce seepage losses but, on account of its altered section (a lesser width and greater depth), also cut down evaporation losses and permit navigation by vessels of deeper draft. A lined channel would also carry water at a higher velocity which would improve the efficiency of the canal by flushing out sand or other matter blown into it by the desert winds

Since the main canal is to be a perennial source of irrigation and will be the sole source of water supply for the entire canal colony, it will be practically impossible to close it down later for purposes of lining The lining must therefore be done now The branch canals could possibly be lined later though even here the balance of advantage would probably lie on the side of immediate action

The lifting of water from the Rajasthan Canal for irrigation and drinking water supply on the left bank is a perfectly practicable proposition On the Grand Coulee Dam in the United States, 16,000 cusecs of water are lifted 280 feet to irrigate the Columbia Basin

As a matter of fact, if more water were available, it would be possible to irrigate not just four million acres of the Rajasthan Desert but double that area It is the measure of India's sacrifice in accepting the World Bank's formula for division of the waters of the Indus Basin between India and Pakistan that there will not be enough water to irrigate the larger area. As initially conceived, it was hoped to divert some of the waters of the upper Chenab into the Ravi through the (proposed) Mahru tunnel and utilise a combined storage of 10 million acre feet on the Ravi and Beas for irrigating the Rajasthan Desert Under the World Bank's proposal Pakistan has been allotted the entire waters of the Chenab

The Rajasthan Canal has now to depend exclusively on the Beas
ich are in an advanced
rt of the project The
one after the other if
the investment in the Rajasthan Canal is to be fully utilised. Any argument that Punjab already has a Bhakra Dam and can therefore wait for other high dams would be foolish and short sighted The Beas and Ravi dams are for Rajasthan and the Rajasthan Canal will feed the nation

The type of lining that should be undertaken could vary from concrete and mortar, to brick and stone A survey of local raw materials is being made along the canal alignment A research laboratory is to be established at Suratgarh to study the whole problem of lining and patterns of desert irrigation

The project is being executed by the Rajasthan Canal Board consisting of representatives from Rajasthan, Punjab and the Centre and with Mr Kanwar Sain as its head The Board functions under an Inter-State Min ... le Union Minister of Irrigation as ... cretary of the Committee of Dire

The Rajasthan Canal Board is responsible for both the engineering and development aspects of the project It will have to prepare an integrated progra ... he entire region The density ... ommand area is under 50 per ... per square mile further south ... ly totally inadequate for dev ... ill be necessary There will be

The new settlers will be given land for cultivation—probably about 15 acres each—and homestead *plots Roads* railways ... markets schools and ...

... ment levy and water rates The inc ... er from the development of a new colony is a colossal undertaking and great care ... ingenuity will have to go into its execution

It should be possible to commence non-perennial irrigation of 130 000 acres in Hanumangarh tehsil from June 1960 Another 300,000 acres lower down should get water in 1961 and a further 700,000—800,000 acres by 1963

The 30,000 acre central mechanised farm at S ... garh has a part to play in this de ...
a Rs 75-lakh gift
the farm can and
sion for the entire
position to supply improved
... and pedigree cattle and sheep to the new canal colonies The farm should, indeed, be made the site of an Agricultural University

The farm, which is now partly irrigated by the Bhakra system and two older non perennial canals, has about 14,000 acres under cultivation. It is a pleasure to drive through tall fields of wheat that make a carpet of green as far as eye can see Yields of 2,000 to 2,400 lbs per acre are anticipated from some of the irrigated fields as against an all-India

average of 640 lbs (1955-56) The land now under crop was, a season or two ago, a desert of sand like much of the area that the Rajasthan Canal will irrigate

It is planned to put 23,000 acres of the farm under crop, plant 2 000 acres of orchard and develop 1,500 acres for animal husbandry schemes The Government of India has leased the area from Rajasthan for an initial period of 15 years

The canal and the farm must go hand in hand and close liaison is being established between the two projects

Last year, two "khalasis" of the canal project unfortunately lost their way in the desert and died of thirst In about 10 years from now, when the project is fully developed, the desert will become a thing of the past, something unbelievable of once upon a time

HANUMANGARH, *February 16, 1959*

TOURIST PLAYGROUND

NEVER has Kashmir been so popular a playground in all the long years of its history as last summer There were many thousands of visitors from the torrid plains of India and from abroad. More and more tourists are being attracted to Kashmir each year Facilities for travel and accommodation have been improved and new resorts have been opened at Yus Marg the Lholab Valley and Sanasar Lake The Kashmiri welcomes this for to him tourism is the very staff of life In countless homes, the earnings of summer determine how well the family can afford to eat and live during the long cold months of winter snow and economic solitude

The problem of Kashmir is not one of politics but of development and the State Government has rightly emphasised this point Better communications is and must obviously be the first priority The nearest rail-head, Pathankot, is 60 miles from Jammu which is in turn 200 miles from Srinagar and 155 miles from Poonch. Long motor convoys move along these roads taking supplies into the State and carrying out fruit, timt [illegible] Kashmir to the markets and emporia of P [illegible] the completion of the Bannihal Tunnel, [illegible] longer be snowbound during winter The first tube of the tunnel, which was opened last winter will be fully completed—with lining and ventilation—before the end of the year The second tube will be completed by the winter of 1959 The project is of very great economic significance

Poonch used formerly to be connected to the Valley by a road running through Uri This has been cut by the cease-fire line The present Jammu-Poonch road was a feat of engineering which the Sappers accomplished during the Operations. It is being improved as part of the five-year plan and should be an all-metal all-weather highway by next year The development of the backward and mountainous Kishtwar dis-

trict of Jammu will also receive an impetus with the completion of the Pathankot-Udhampur road on which work is in progress This road will open up rich possibilities for tourism in the snowy Pir Panjal range In Kashmir, the terrain is such that development almost automatically follows communications

The air link to Kashmir also needs to be improved Srinagar is not an all weather airport It could perhaps be made so with suitable radar installations

[illegible] howsoever

[illegible]

be quite feasible to [illegible] Udhampur It should again be possible to connect Udhampur with Qazigund, in the Valley, below Bannihal—a distance of about 100 miles—by ropeway and link this up with a railway system within the valley itself to Srinagar and even up to Baramulla There is a sufficiency of cheap hydro-electric potential within the State that can be tapped for these projects

[illegible] Srinagar with ropeway feeders from [illegible] isive undertaking no doubt [illegible] te But it can be expected [illegible] up the mineral wealth and [illegible] nore economic exploitation Valuable sulphur deposits were located in the Zanskar range in Ladakh some years ago but these cannot be commercially exploited in the absence of communications Even the relatively more accessible Kashmir lignite deposits have not been touched

Better communications would facilitate the development of a wide variety of industries—from paper and sports goods to fruit canning and drug manufacture—for which the necessary raw materials and power are available It would also permit a second tourist season for those who enjoy snow and winter sports

After communications, agriculture claims the next priority Radical land reforms have been carried out But the State is deficit in food grains and, as elsewhere in the country, this is a situation that is being sought to be remedied by distribution of improved seeds and fertilisers, irrigation and reclamation Fertilisers are being distributed on loan through panchayats and co-operatives

The approach to community development has been to extend the programme throughout the State from the start and then gradually to work up to more intensive activity This has certain advantages but has probably entailed an unduly wide dispersal of resources and personnel Near Poonch, for instance, I was shown a quantity of agricultural implements received from headquarters, most of them totally unsuited for terraced hill cultivation The panchayat movement has been encouraged [illegible]

have been forthcoming Some of these funds might have been spent more usefully in other directions

Irrigation is perhaps more important in Jammu than in Kashmir Large and tracts known as *kandi* lands could be reclaimed if water were available both for irrigation and drinking purposes Here again the State appears to be lacking in technical personnel In the First Plan period the Kishtwar canal project had to be abandoned after an expenditure of several lakhs of rupees as it was discovered to be technically unfeasible Another Rs 12-crore project on the Ravi designed to irrigate about 30 000 acres of *kandi* land has been included in the Second Plan I understand that the first project survey is being followed by a revised survey It would be most unfortunate if this much needed project were unduly delayed

Orchards drug farms and mulberry plantations (for silk) offer great possibilities Many valuable medicinal plants are indigenous to Kashmir or could be cultivated there Several drug farms have been started and are being expanded Two drug factories have been established in Srinagar and Jammu respectively to manufacture preparations of belladona menthol papine pyrethrum and other active ingredients extracted from locally cultivated herbs There is tremendous scope for development here

Income from forests was one of the principal sources of revenue to the State before Independence The whole timber industry was dislocated following the raids and the loss of some of the richest forest areas across the cease fire line The industry has however been revived and the income from timber and minor forest products has touched new peaks

The State Government needs to be more active in developing its wool resources Kashmir has been traditionally dependent on Tibet for *pashm* from which its famous pashmina shawls are made This dependence can be quite easily ended by breeding pashmina goats in Chanthang the eastern plateau of Ladakh (14 000 feet) which is geographically part of Tibet Some efforts are now being made in this direction after abortive attempts to breed the pashmina goat at the lower altitudes of Banihal and Leh

The arts and crafts of Kashmir have been given a great fillip through the establishment of the Kashmir Arts Emporium Over 75 work centres have been set up production has been standardised and wages have been upgraded with the elimination of the middleman A School of Designs is being established The marketing organisation has been greatly strengthened Sales in 1956 57 were of the order of Rs 35 lakhs of which over Rs 11 lakhs were in the export market It is hoped to double sales and provide direct employment to over 5 000 craftsmen by the end of the Second Plan

Health facilities have been expanded and education has been made free from the primary to the university level This does not mean that every child goes to school But a beginning has been made especially in girls' education Although a University was established some years ago it has made little progress and the twelve colleges in the State are curiously enough directly administered by the Directorate of Education Two technical schools and a polytechnic have been started Altogether however greater attention needs to be given to both higher and technical

education under the autonomous direction of the University The State needs leaders administrators and technicians in every field and men with a liberal and modernist outlook.

SRINAGAR, *June 1958*

"LITTLE TIBET"

THE capital of Ladakh or "Little Tibet as it is sometimes called, is barely 65-minutes from Srinagar by air through a spectacular corridor of pyramids of rock and ice that tower into the sky It is situated in a different world Leh is 11 500 feet high It nestles round a hill at one end of a small open valley sloping down to the Indus The landscape is barren. Most of Ladakh is a treeless waste of sand and rock a desolation of tawny brown with snow at the higher altitudes and beautiful but all too occasional oases of green wherever there is water The land is tortured by extremities of climate for the sun burns hot when the sky is clear No part of Ladakh is below 9 000 feet It is among the highest inhabited territories in the world with some sparse cultivation at elevations of even 15 000 feet There is very little rainfall Only about 75 000 people live in this huge mountainous expanse of 37 000 square miles

There is no air terminal at Leh—only a signpost It has six arms They read Tibet—107 miles China (Sinkiang) — 180 miles Russia — 600 miles Srinagar — 220 miles Delhi — 784 miles Manali — 300 miles *I rode a pony four miles into town It took 90 minutes The wheel was* unknown in Ladakh until an aeroplane arrived ten years ago A few jeeps followed Within a year or two when the Leh Kargil road is complete there will be lorries and perhaps cycles The bullock-cart will come last of all—if it does come

At one time Leh was a great bazar a crossroads of Central Asian trade Caravans called from Yarkand Tibet Srinagar and beyond and many lakhs of rupees worth of merchandise were bartered Now the Chinese Communists have closed the Sinkiang route Brigadier Dalil Khan a Kazak refugee has a shop in Leh bazar Two hundred other compatriots of his have left India to settle in Turkey Last year a small caravan *did come from Sinkiang with Haj* pilgrims who traded a few carpets to finance their onward journey That was all The traditionally smaller Tibetan trade continues Pashmina salt and precious stones come in and are exchanged for grain borax and tea

Ladakh has had a chequered history under its Rajas or Gyalpos who have variously acknowledged the suzerainty of Kashmir and Tibet The territory was finally annexed to the Sikh empire by the great Dogra General, Zorawar Singh whose Tibetan campaign (1834-41) is the only one in the last 2,000 years that has led to a permanent enlargement of the Indian dominion. With the Treaty of Amritsar of 1846 Ladakh became part of Jammu and Kashmir in the independent possession of Maha

raja Gulab Singh The population was disarmed and the Rajas exiled to Stog, a village eight miles from Leh across the Indus, where they still reside The present Raja is an honorary Lieutenant in the Army

Ten years ago, Pakistan brought war to this peaceful land The invaders were repulsed barely a dozen miles from Leh Today nearly half the district lies across the cease-fire line

Buddhism was firmly established in Kashmir at the time of Asoka and entered Tibet through Ladakh in the seventh century A D The Brahmanical revival in Kashmir and subsequent Muslim conquests from the south west and north rolled back the Buddhist frontier Buddhism survived in Eastern Ladakh but came increasingly under Tibetan influence, owing spiritual allegience to Lhasa Leh remains the western capital of Lamaism.

There are two Buddhist sects in Ladakh The original Red Hat Sect is numerically larger The later, reformist Yellow Hat Sect is more orthodox and more closely influenced by Lhasa in spiritual matters

The Ladakhi Buddhist is intensely religious Even in the heyday of the Rajas the administration combined both secular and theocratic power through the influence of the gompas or monasteries There are ten major gompas, each presided over by a Kushak or Abbot The numerous lesser gompas are subsidiaries of one or other of the larger monasteries There are about 1,500 lamas in Ladakh and many more 'bhikkus' and acolytes of lesser degree

Gompa's, bein- ... locat-
ed in some sequeste ... 'ound
atop the most aus ... tier
upon tier after the ... pe is
dotted with *chortens* and *mane-walls*—long walls of stone inscribed with the invocation *Om Mane Padme Hum*—every repetition of which brings the devout nearer *nirvana*

The largest and most famous gompa is at Hemis, 25 miles from Leh The oldest is five miles from Leh, at Spittuk, the Abbot of which is Kushak Bakula Minister for Ladakh Affairs in the Kashmir Government Kushaks, like the Dalai Lama, are incarnations, the spirit of the dead Master entering the body of a child conceived at that very moment The Kushak of Hemis a young boy, is being tutored in Lhasa So also the Kushak of Rizdong, a cousin of the Rani of Ladakh and a Lahouli like herself, who was "discovered" at the age of 12 while he was studying at a school in Dalhousie

The Gompas have been exempted from the Kashmir Big Landed Estates Abolition Act and they still retain large estates which are farmed by lay monks Other devout Buddhists render free labour, give alms to the lamas and generally buy salvation For a small fee, I am told, the lama will exorcise evil spirits, guarantee safe delivery at child-birth and recite *mantras* for the sick

The Ladakhis are a simple, honest, hardy, superstitious people, full of laughter and without malice Crime was unknown until 'civilisation" arrived a few years ago There is only a very thin ribbon of arable land along the rivers and waterways in all that vast expanse of territory Agriculture is very difficult and yields are low

The institution of polyandry was practised by the Buddhists in order to limit the population in relation to the productivity of the land. Polyandry is now banned by law and is gradually disappearing, though young people in Leh still refer to their *bada dada* (big father) and *chota dada* (little father). Most families used to "contribute" at least one or more younger sons to the gompa (where celibacy is enjoined) and where the more gifted and influential of them can even now rise to become lamas after due training in Lhasa. Nunneries are less common

[illegible] primogeniture, [illegible] absence of any the er[illegible] harder than the male [illegible] lk, con- [illegible] and an [illegible] jewel- [illegible] turquoise down their plaits This last ornament, the *peyrak* as it is called, constitutes a woman's bank account and may be valued at several thousand rupees

The Muslims came to Ladakh only a few hundred years ago They have converted some of the local population and acquired landed property mostly through marriage with Buddhist girls A Christian Moravian Mission was established in Leh a hundred years ago There are today 129 Christians in Ladakh and their number is diminishing There has been a long tradition of religious tolerance—as elsewhere in Kashmir—and the Buddhists, Muslims and Christians live together on terms of the utmost cordiality

Ladakh is a very backward area and early completion of the Leh-Kargil road is of the highest importance [illegible] nt Road [illegible] man-power. [illegible] time over [illegible] air This [illegible] Army con- [illegible] the Zoji-la, ten years ago

The passes from Leh to Tibet on the east and Sinkiang to the north are 18 000 feet high [illegible] The Changpa nomads who inhabit [illegible] which constitutes Eastern Ladakh- [illegible] inhospitable terrain A road connect[illegible] acha pass (16 000 feet) into Lahoul [illegible] ough it would be open for only a fe[illegible] the Zoji-la, at 11,300 feet, is snow-bound for seven months) But it is worthwhile to remember that during the Kashmir operations Leh was first relieved by units sent from Manali

Irrigated land and livestock are wealth in Ladakh The waterways are snow-fed and, on a warm day, it is an extraordinary sight to see a dry *nullah* in the morning become a running stream by noon and a raging torrent by evening By nightfall, the snow would have frozen and the *nullah* is dry again But the land is so parched and porous that even the flood waters of the *nullahs* that flow by Leh never reach the Indus five miles away Water is stored in little tanks wherever possible. A few small irrigation projects on the Indus are under execution. One of them will irrigate 1,000 acres and another 5 000 acres The Shyok and Nubra valleys lie to the north of Leh They are lower, wider and more fertile but less accessible.

The entire district is covered by two N.E.S. blocks centred at Leh and Kargil. Fertilisers are being popularised. Rice, barley and buck-wheat is grown. There are a few orchards of apricot and apples in the lower valleys. An afforestation programme has been initiated. Poplars, willows and rubinia are the only trees that thrive.

Cattle and yak are found but it is popular to cross these species The offspring of these unions are Zhos (bulls) which are good draught animals but sterile, and Zemos (cows) which are good milkers. Further cross-breeding is practised and one hears of strange animals possessing subtly different qualities from each other such as Stolmos, Garmos and Dimzos. The Bactrian (two-humped) camel is not indigenous to Ladakh but is found there.

The people are generally healthy and suffer from few infectious diseases. Baths are unknown and lice are frozen to death by exposing garments to the cold night air.

There is a hospital at Leh, a girls' primary school and a mixed high school where I found myself taking the "general salute" during the drill period. A weaving and carpentry centre has recently been established.

A Government pashmina-goat farm has just been started at Shushol in Chan-thang, near the Tibetan border. Efforts should also be made to organise the manufacture of salt from the salt lakes in this area.

Strategically, Ladakh is a vital frontier district. Parts of the Sinkiang border are just "somewhere in the mountains". The frontier with Tibet lies on what is geographically part of the great Tibetan plateau. The nomads on both sides freely cross the border in search of pastures. Our frontier checkposts are situated as far beyond the last point of habitation as possible. Sometimes this may be a few days' march from the actual border. But patrols move up to the border during summer.

The economic and strategic problems of Ladakh are such that it needs special understanding. The lamas and gompas must be more consciously harnessed to the plan. The district needs a dedicated corps of administrators who are sympathetic to the land and the people. At present, not a few of the officials regard their posting in Ladakh as a punishment and anxiously count the days for their two-year term to expire. They cannot be blamed, for life is very different and difficult. It would be desirable to recruit selected Kashmiri and other officers for service in Ladakh (and in Himachal, Kangra and Kumaon) as part of the Indian Frontier Administrative Service which is at present confined to N.-E.F.A. The Ladakhis too must be educated and trained to administer their own land.

The development of Ladakh is an undertaking that is beyond the resources of the Kashmir Government. Yet the development of the area cannot be neglected or delayed. In the special circumstances of the case, the Government of India might perhaps give the Kashmir Government a special grant-in-aid for Ladakh.

LEH, June 1958.

GARAGE WORKSHOPS

A TRIP to Ludhiana might not sound an exciting proposition A visit round the small industries located in that city is however a remarkable experience Ludhiana has its bazaars like any other place But some of these bazaars are quite unusual for the hosiery goods cycles, sewing machines machine tools oil engines and other engineering products [illegible]
side
and ta

Ludhiana is primarily a centre [illegible]
products especially bicycle and sewi[illegible]
There are also a number of small fou[illegible]
hosiery and 400 engineering units in[illegible]
[illegible] under 50 men The
enterprises Their
a centre for sports
goods hardware rubber goods and surgical instruments Batala for machine tools Jagadhri for brass utensils and Ambala for scientific instruments and glassware These small units are doing excellent business *Their output* range *of production* and quality have steadily increased and *improved and they are* making a valuable contribution to the nation's economy

The rise of these small industries merits study I was informed that a *class of traditional artisans* known as Ramgharias live around Ludhiana and it is *these men* who have pioneered many of the new industries The first impetus came *during the* war when import shortages and supply difficulties suggested a remedy in local manufacture of parts and components *Subsequently this developed* into assembly and complete manufacture of cycles, *sewing machines* and machine tools The hosiery industry however probably has other antecedents Initiative and inventive skill were needed in devising *simple* but effective tools and adapting them to new uses *Once* a few units got started in any centre various ancillary and special services developed such as *supply of raw* materials or *marketing facilities* a pool of certain skills and availability of parts. The displaced persons *who came* from Pakistan after partition introduced new skills and a *fresh lot of* entrepreneurs The sports goods *industry* which flourished in Sialkot was for instance established *in* Jullundur

The State Go[illegible]
and
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ther [illegible] a number of units have started moving out of their *cramped premises* in the city to enable them to spread out and expand. An Industrial Estate is also under construction. This will be provided with all facilities *and has been heavily booked*

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undertakes blueprint reading and runs an extension service in a number of centres in Punjab and Himachal Pradesh The Institute s model work shop at Ludhiana, which will soon be ready, will demonstrate improved techniques train skilled personnel and manufacture prototypes It will be equipped with metallurgical and foundry testing laboratories and will perform a very useful service

The S I S.I works in liaison with the State Directorate of Industries which is responsible for assisting in the procurement of raw materials and marketing and for awarding 'essentiality certificates" for imports

Most of the units in Ludhiana have been built up from very humble beginnings by dint of hard work and enterprise Sardar Jagir Singh proprietor of the Royal Sewing Machine Works, is a completely self made man He is no scholar and was employed as a worker in a local sewing machine unit until 1951 when he decided to invest his savings of Rs 2000 3000 in a factory of his own Jagir Singh began by making one or two sewing machine parts Today his assets total Rs 50 000 and he em ploys 33 workers to manufacture six different parts which account for about ten per cent of the total value of a sewing machine The interesting thing about this plant is that all the machine tools have been made by Jagir Singh himself in his workshop He has simplified all the processes involved in making sewing machine parts and is able to employ relatively untrained workers as his home-made jigs and fixtures are fitted with stops and controls He has his own little foundry and his annual turn over is of the order of a lakh of rupees Jagir Singh has now decided to undertake the manufacture of zig zag embroidery machines which are at present being imported The project is being designed by the S I S.I and will cost Rs 4 5 lakhs which will be partly met by financial assistance from the Government Here again Jagir Singh plans to fabricate about 60 per cent of the new plant and machinery required in his own workshop

Deepak Industries is another typical unit It makes Greyhound bicycles This unit was started by a displaced person in 1952 and has a capital of Rs 1 40 lakhs The entire plant is of local Ludhiana make The unit has been licenced to manufacture 5 000 cycles per annum (18 cycles per day) The Greyhound cycle costs Rs. 105 of which Deepak Industries makes parts worth Rs 35 Another Rs 30 worth of parts is procured from local cycle part manufacturers while the balance of Rs 40 is imported or purchased from other parts of India

Deepak Industries is a good firm which finds itself hamstrung by Government policies It is a condition of his licence that every manu facturer must himself make the following four parts namely the frame fork, chain stays and seat stays This entails a wasteful multiplication of capacity for the manufacture of these parts Deepak Industries is licenced for only 5,000 cycles per annum and it is uneconomic for it to be burdened with plant for the manufacture of these four compulsory parts unless it is allowed to expand It also has surplus capacity in the electroplating department

The several large manufacturers in the country are all licenced to make complete cycles It would have been far better to reserve the pro duction of certain components for the small units so that they could feed the bigger producers The replacement market at least should be reserved for them Such an arrangement would bring down the cost of both the large as well as the small units and would mean a cheaper bicycle for

the consumer Meanwhile, there is no reason why the small producers should not themselves get together to evolve a pattern of production that would enable each unit to specialise in the production of a single part or a limited range of parts

The Kapur Bhimbar Union makes bench type lathes Its proprietor came from Pakistan with Rs 35 in his pocket, worked in a number of plants and then started his own industry in 1951 with an investment of Rs 3 200 The capital investment of the firm is now Rs 60,000 and its monthly output of six to eight machines is marketed all over India

The Kapur Bhimbar Union is a member of the Ludhiana Machine Tool Makers Guild. All but a dozen of the 55 or so machine tool makers belong to the Guild which assists in procuring raw materials from Government.

The hosiery industry is older than most others in Ludhiana and the Sohan Hosiery Works was started in 1937 The firm makes high quality [illegible] unt of the s[illegible] on an assoc[illegible] of Hariana [illegible] for the manufacture of cycle hubs on the basis of a programme drawn up by the S I S I The Hariana Engineering Works markets its hubs for Rs 8 8 a pair as against a price of Rs 14|8 for the imported variety

The proprietor of this firm had earlier applied for a licence to establish a three ton electric furnace for smelting steel from scrap but received no response from the Government This again seems rather a pity as raw materials especially steel, constitute a major bottleneck in the way of development of these small industries

Power shortage is another serious bottleneck. Everybody complained that the power supply was irregular and power breakdowns frequent. This however will be put right within the next two years when Bhakra power comes on the grid.

These small units have [illegible] national inter[illegible] and develop[illegible] made in Ludh[illegible] be

LUDHIANA, February 17, 1959

Conclusion

SEEING A REVOLUTION

THERE is an aspect of India that is too little seen by many people The general view is often clouded by the dust of political controversy and administrative "scandals," evidence of red tape, rising Plan costs and reports of nepotism and corruption. This sometimes tends to create an atmosphere of cynicism and gloom This is one side of the medal.

There is, however, another side of India that I have glimpsed in the course of an 8,000-mile journey visiting the Plan And the impression on the whole is of an immensely exciting country in which great things are happening

A visit to any one of such projects as the new steel plants, Kosi, the Kaira District Milk Co-operative at Anand, the Bakshi-ka-Talab Extension Training Centre, Neyveli, the Fuel Research Institute, the small industries of Ludhiana, Hindustan Machine Tools, the Atomic Energy Establishment, the Terai State Farm, Sindri, Tungabhadra, Dandakaranya or the Bhakra dam is stimulating in itself To visit one or more such projects every day for forty consecutive days in almost every part of the country, and know that there are others, is to see a revolution

The atmosphere is different in this other India So are the attitudes The farmers, engineers, scientists, extension workers, administrators, managers, entrepreneurs and social workers engaged in this revolution are men of purpose and determination, anxious to get on with the job in conditions that are not always comfortable, often difficult They are filled with a sense of challenge and adventure

It is particularly heartening to discover such a wealth of talent in the field The young engineers and technicians who are building the new dams and factories and the scientists at their elbow, are men of purpose who have been quick to learn new skills and techniques, improve upon them and adapt them to Indian conditions

Many of the young administrators are also men of promise Having met some of them, I find it difficult to subscribe to the view that [illegible] before them [illegible] on the retire- [illegible] not less com- [illegible] less experienced and receive far less guidance and in field training from their superiors than their predecessors did. This is largely because the administration has expanded so rapidly that training and supervision have become less intensive at all levels Lack of personnel has also led to an unfortunate but temporarily unavoidable lowering of standards in some cases

Although the fire of nationalism still burns strong in India, we suffer from an inferiority complex. We lack confidence in our own talents and abilities and, therefore, tend to inhibit action or wait for foreign assistance or experience before undertaking a project At the technical level, I believe this is partly accounted for by the fact that

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some of the older engineers, technicians and scientists, who hold positions of responsibility, have sometimes found themselves in situations quite beyond the range of their own knowledge and experience and have tended unconsciously to display their authority by restraining the initiative of the younger men This phenomenon is perhaps now beginning to exhaust itself as a new generation rises to positions of higher responsibility

Another reason for hesitation flows from the organisational difficulties experienced at the earlier stage of development This again is being steadily overcome with experience and as more dynamic organisations for development are evolved

This is not to suggest that the country has no need for foreign technical assistance There are a number of specialised fields in which Indian experience is limited. But more often than not the demand for foreign technicians arises not because we have not got the requisite skill but because *we have not got enough of it* This quantitative gap could be considerably narrowed by putting our own qualified personnel to the best possible use without permitting parochial considerations to come in the way

There has of late been a good deal of interest aroused by reports of the Chinese increasing pig iron production through cottage furnaces But no one has taken any significant notice of the far more relevant development of a backyard blast furnace and alloy steel making furnace and rolling mill built by Messrs Textool in their own workshop in Coimbatore We are aware of the great progress made by small scale industry in Japan, but we do not know enough about the achievements and possibilities of the small units in Ludhiana and elsewhere in the country. In the field of agriculture, the U P method of wheat cultivation does not sound as glamorous or promising as the so-called Japanese method of paddy cultivation There is so much that India can learn from India And there is a great deal that Indians could achieve if only given encouragement and opportunity

If the administration is sometimes reluctant to rely on the Indian expert or displays a degree of caution amounting to inactivity, it is because it is afraid to take a decision Lower down the scale, it may sometimes be the case that not enough powers are delegated to an administrator to enable him to take a decision and initiate action But it is equally true that where authority is delegated it is not always exercised by the junior official.

If the Government and individual officers are afraid to take decisions it is because the country is intolerant of mistakes But a nation, like an individual, learns by mistakes and if mistakes are to be avoided by the simple expedient of doing nothing or as little (and as late) as possible, then progress will be slow The mistakes will not necessarily have been avoided They will probably have only been postponed.

In the present climate of the country it is extremely unfortunate that no mistake can be committed without immediate suspicion of corruption, conspiracy and malice and a cry for somebody's head Irregularities must be swiftly and adequately punished But it is the administrator and technician who is bold and imaginative enough to act, and might make a bona fide mistake in the process, that is the country's greatest asset. A positive and sympathetic attitude on the part of Parliament,

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Another major impediment to progress [illegible] decisions and swift [illegible] Time is money Prompt [illegible] to a far greater [illegible] administrative [illegible] of financial [illegible] are out of [illegible] nment and are [illegible] economy and [illegible] and economy. an expanding public [illegible]
The new motto must be to hurry decisions and invest a rupee today in order to earn two rupees tomorrow In nine cases out of ten, the fact of a decision is more important than the nature of the decision.

[illegible] too The approach must not be [illegible] as to whether something cannot [illegible] ore often than not the hypothetical saving might ultimately prove to be only a fraction of the unseen loss in terms of delayed production, employment and income The minister or administrator who sits on a decision for a month or a year and who may be able to point to a possible saving (or avoidance of loss) of Rs. X is honoured But the unseen loss in terms of delay in realising the benefits of a new road or canal or factory might be of the order of Rs X multiplied by ten. The unseen losses on account of procedural delays are certainly very substantial and every effort must be made to cut them down to the barest minimum. As before, public and political opinion has a positive role to play in achieving this result.

Decentralisation of responsibility is necessary at all levels and such delegation of authority will become effective only to the extent that the Government and the people learn to trust the man on the spot. Anyone found incompetent or corrupt must be removed or punished, but initiative must be passed down.

Devolution of responsibility is important for another reason It serves in some measure to democratise the administration by enlarging the circle of Government The new pattern of local administration through popular councils at the village, block and district level that is being introduced in a number of States is a step in the right direction. Here again, there will be mistakes and muddles But once these teething troubles are over the country will probably find that it has a far more efficient and responsive administration and a far wider popular commitment to the Plan than at present.

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... and livestock. They should ... be centres of supply ... for demonstration. They should also be the nucleus of elementary agricul-

MARKET INCENTIVES

INDIA is a predominantly agricultural country But this fact does not appear to be adequately reflected in our thinking and planning The Central and State Secretariats, the Planning Commission, Parliament, the State Legislatures and most universities and newspaper offices are located in the cities and are enveloped in an urban atmosphere The language of the administration, English, unconsciously adds to this urban bias, at any rate in Delhi

If there is one factor more than any other that would by itself stimulate a chain of rural development, it is the existence of a market outlet. The Kaira District Co-operative Milk Union has been such an outstanding success only because it offers an assured market in the Union's dairy at Anand In the Tungabhadra *ayacut* in Mysore, the areas localised for sugar-cane have been stabilised wherever there is a sugar factory to absorb the crop while cultivation has languished in the adjoining tracts Similarly, cotton In Rajasthan, I met a farmer, Prabha Dan, who would grow excellent vegetables and produce more milk if only he could market them at Jodhpur, 40 miles away

A market outlet implies not only a market but one where the farmer can sell his products at reasonably good prices that provide incentives for increased production Co-operative marketing societies have an important role to play in developing such market outlets The establishment of grain godowns, where farmers can store their produce against immediate cash credits and sell it later when the market recovers from the post-harvest slump in prices, has proved greatly beneficial wherever it has been tried.

Getting to the market requires roads In many areas the mere absence of an all weather road has dampened progress and initiative while the construction of a road has induced development and change by the very fact of access to a market There are other areas where the markets are distant and where even a road by itself is not enough There must be an adequate and regular system of transportation The bullock cart will not do It is too slow and time-consuming There must be a more efficient means of movement by railway truck or boat. The schemes of inland navigation linked up with some of the river valley projects such as Hirakud and Tungabhadra will provide an important means of communication The Kaira District Co-operative Milk Union, again is only able to function because of a network of 'milk roads and a fleet of fast vans that move the milk from the collection centre to the dairy at Anand, 10 15 or 20 miles away In the *gramdan* villages of Koraput the Sarva Seva Sangh has a few trucks that carry grain from the co-operative grain *golas* to the more distant markets

Roads and road transport are absolutely vital for rural development Yet the road programme is listed among the more expendable items of plan-expenditure while the policy regarding road transport is short-sighted and unimaginative The type of road rail competition that is increasingly evident today is wasteful and inimical to progress

The whole policy of agricultural prices too needs to be carefully studied The assurance of reasonable and stable prices is only another

aspect of marketing The farmer must be offered stability and incentives if he is to produce more

Unless the farmer ... prices for ... contrary, his family ... sities. Un... a marketable surplus I believe this is one of the basic propositions of Indian agriculture

Given the market, the farmer obviously needs to be educated in better methods of cultivation so that he can get the best out of his land and increase his yields. This calls for extension activity, an assured system of supply of improved seed, fertilisers and so forth and credit. At present the accent is on extension without a corresponding effort to create "marketability"

The community projects and national extension service have been useful in introducing new ideas and instilling a psychology of change in the rural mind But ... un-even, varying in acc... om the District Collector ... to the village level worker The programme has made headway wherever an intelligent and ima... such cases the popula... the programme has b...

The community development movement has suffered from a dispersal of effort that has perhaps tickled the urban vanity of the higher administration by a sense of paper achievement The attempt to cover the entire country too soon was, however, a mistake that has resulted in weaknesses These are now being sought to be corrected.

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tural polytechnics that would attract young farmers, provide them with basic training in agricultural theory and practice and throw them back into the villages through the extension agencies.

The problems of agricultural supply and credit are probably best tackled by co-operatives I came across a number of multi-purpose co-operatives that are doing good work Nowhere, however, did I discover a *sahukar* or traditional village money-lender who had been brought into the ambit of the co-operative movement I got the impression that this class of people has been driven away from the village and that the local authorities have been content to see this happen. The *sahukar* has capital, experience, local knowledge and a head for finance It may be of advantage to try and retain him in the village and this might sometimes be possible given a different approach.

The Government's policy of encouraging the growth of multi-purpose co-operatives throughout the country is eminently correct and sensible These co-operatives could provide the resources and organisation for agricultural development, credit and marketing while their surpluses could be tapped for financing ancillary developmental activity such as processing industries But the lesson of the community development movement underlines the need for caution. It would be unwise to try and rush progress and risk failure Co-operation is a state of mind and a rustic mind once prejudiced by failure will not be easily persuaded a second time

In a large and complex country like India it would also be rash to try and lay down rigid, uniform policies The co-operative movement has been thrown into a state of confusion by the rather academic controversy raging in Delhi regarding the size of the co-operative units. The earlier preference for large societies has yielded to a policy in support of small, single-village societies This type of rigidity will only cramp the movement In the Raichur district of Mysore, it was discovered that individual villages were unable to support a vigorous society. They lacked the resources Now large societies have been developed, embracing groups of villages and these are functioning satisfactorily. In other areas, experience has shown that small societies are more useful.

In co-operation as in other fields, the pattern of development must fit in with local circumstances This will only be possible if the administration is decentralised and local officials are vested with discretion to act as they think best in pursuance of given, overall objectives

While there is every need to promote service co-operatives and the people have readily responded to them, I have not detected any enthusiasm for joint co-operative farming in any part of the country On the contrary, everywhere I went, I was told of experiments in joint cultivation that had failed and sometimes ended in litigation The U.P. terai has many such examples Other examples are to be found in the *gramdan* villages of Koraput where the climate for co-operative farming is far more favourable than elsewhere

Any attempt to rush the country into joint cultivation, howsoever voluntarily, may only arouse fear and antagonism towards the whole co-operative movement. Joint farming has certain attractive features in a country where most peasants possess uneconomic holdings But it is still too radical a change with which to confront the people at this stage.

Once the service co-operatives are firmly established the *logic of higher forms of co-operation may become evident* in the ordinary *course of events.*

Turning to another field, the country is not getting the return it should *from the large and medium irrigation projects because of insuffi-* [illegible] The introduction of [illegible] change which [illegible] *is only possible* [illegible] ts inception so [illegible] as soon as it [illegible]) to 15 years *for an irrigation project* [illegible] date The country cannot afford to [illegible] vestments and, *given some thought* [illegible] period should not be reduced to two [illegible] pecial Administrator and a special [illegible] To spend [illegible] the irrigated [illegible] means of the normal budget [illegible] t on rapid development will [illegible] ason The pattern followed [illegible] all State Governments

PRODUCTION AND PRODUCTIVITY

AFTER visiting a number of State enterprises and private firms, the much debated distinction between the public and private sector appears rather artificial There is no real conflict between the two except in the minds of certain people Their objective is the same—production. Both enjoy [illegible] ertain disadvantages inherent in [illegible] The private contractor building [illegible] as good as the departmental ag[illegible] building the Bhakra Dam

The public sector and the private sector are severally and jointly no better and no worse than the sum total of the efficiency and integrity of the 400 million people of India The private sector has its black sheep just as much as the public sector has its failures The private sector perhaps also suffers from its past. Accord[illegible] of private ent[illegible]

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... getting the return it ... ects because of insuffi- ... The introduction of ... tionary change which ... This is only possible if an Administrator is associated with the project from its inception so that the farmers and fields are prepared to receive water as soon as it is available. The idea that it takes 10 to 15 years for an irrigation project to attain full development is out of date. The country cannot afford to wait so long for returns on huge investments and, given some thought and care, there is no reason why this period should not be reduced to two or three years. This will require ... Administrator and a special ...

... all State Governments.

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tion would therefore be wasteful. It must be the objective of industrial planning to dovetail the production programme of all the agencies, public and private, large units and small.

Further, the Government has sufficient powers in its armoury to regulate and control private industry at every stage—its licence, location, raw materials, imports, power supply, movement of finished products, labour policies and prices. The private sector is and can always be moulded in accordance with the demands of the Plan.

What is important is not the totally unrealistic and angry controversy of public sector versus private sector, but production and productivity. Except in the case of certain strategic industries, it does not matter in the slightest who produces what. What does matter is the quality and quantum of production and costs. It is this aspect that calls for close and continuous attention.

The four things most needed for production are transport, power, raw materials and training. There is so much that could be produced —minerals and forest products for instance—if only there were adequate transport. The country has not yet been opened up, both extensively and intensively.

The absence of power in some areas and power cuts in others has operated as a major bottleneck in the development of industry. Load forecasts are having to be revised every year while the actual growth of loads has always proved far more rapid and diverse than anticipated.

Raw materials constitute another serious bottleneck. The shortage of iron and steel, special and alloy steels and non-ferrous metals has been particularly felt. The new trend towards liberalisation of raw material imports and the commencement of production from the new steel plants should greatly ease the situation.

Travelling round the country, I was impressed by the number of new technical institutes that are springing up everywhere. The demand for technicians, supervisory cadres and skilled workers is insatiable and more and more of these institutions and training centres will be needed every year.

The whole apparatus of Government, the Planning Commission and public opinion needs to become more production conscious. And this must be associated with the concept of productivity at every stage. Productivity means getting the best out of all the factors that go into production—building space, machinery, raw materials, labour and management. This is a very vital consideration that has not yet been vested with the importance it deserves.

In most of the public enterprises I visited, I was informed that labour efficiency has been steadily rising while costs have been progressively lowered. There is, however, a tendency in some cases to be satisfied with merely producing something for less than the landed cost of the corresponding imported product. This is not a good enough standard.

Costs could also be brought down by a more deliberate and thoroughgoing policy of standardisation of designs and products. The automobile industry is an outstanding example. Hindustan Shipyard too has suffered from a multiplicity of designs.

Overheads too need to be lowered Very few public sector plants work three shifts Most of them work only one and a half shifts Raw material difficulties or lack of demand is the reason usually offered for this state of affairs Ways and means could and should be devised to get round raw material difficulties and expand production for export The present pattern of entering into contractual obligations with foreign associates that limit the exports of public enterprises over a certain period or area needs to be recast

One reason for the high-cost basis of much of Indian industry is the attempt on the part of each unit to manufacture all the parts and components it requires This may initially be because of the absence of

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Maintenance of plant and equipment is another aspect of productivity that needs greater attention The very high standard of maintenance of heavy earth moving equipment at Neyveli could serve as a model

The public sector must be cost conscious and the finances and accounts of public enterprises should be overseen and maintained by a corps of men with a commercial outlook rather than by veterans of the Indian Audit and Accounts Service whose training and experience is rather different

The public sector has set a high standard in labour welfare and housing and output has gone up wherever incentive schemes have been applied and where cordial labour relations have been promoted through various agencies of joint consultation ranging from simple works committees to Joint Workers Councils and Joint Councils of Management

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tion would therefore be wasteful It must be the objective of industrial planning to dovetail the production programme of all the agencies, public and private, large units and small

Further, the Government has sufficient powers in its armoury to regulate and control private industry at every stage—its licence, location, raw materials, imports, power supply, movement of finished products, labour policies and prices The private sector is and can always be moulded in accordance with the demands of the Plan.

What is important is not the totally unrealistic and angry controversy of public sector versus private sector, but production and productivity Except in the case of certain strategic industries, it does not matter in the slightest who produces what What does matter is the quality and quantum of production and costs It is this aspect that calls for close and continuous attention.

The four things most needed for production are transport, power, raw materials and training There is so much that could be produced —minerals and forest products for instance—if only there were adequate transport The country has not yet been opened up, both extensively and intensively

The absence of power in some areas and power cuts in others has operated as a major bottleneck in the development of industry Load forecasts are having to be revised every year while the actual growth of loads has always proved far more rapid and diverse than anticipated

Raw materials constitute another serious bottleneck The shortage of iron and steel, special and alloy steels and non-ferrous metals has been particularly felt The new trend towards liberalisation of raw material imports and the commencement of production from the new steel plants should greatly ease the situation

Travelling round the country, I was impressed by the number of new technical institutes that are springing up everywhere The demand for technicians supervisory cadres and skilled workers is insatiable and more and more of these institutions and training centres will be needed every year

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One reason for the high-cost basis of much of Indian industry is the attempt on the part of each unit to manufacture all the parts and components it requires This may initially be because of the absence of ancillary units of production but subsequently itself comes in the way of development of such ancillary industries. The necessity for such autarchy could possibly be reduced by a carefully planned programme of decentralised production.

Maintenance of plant and equipment is another aspect of productivity that needs greater attention The very high standard of maintenance of heavy earth moving equipment at Neyveli could serve as a model

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The public sector has set a high standard in labour welfare and housing and output has gone up wherever incentive schemes have been applied and where cordial labour relations have been promoted through various agencies of joint consultation ranging from simple works committees to Joint Workers Councils and Joint Councils of Management. The Tata Iron and Steel Company has, however, evolved a more elaborate pattern of labour participation in management through a three-tier structure of consultative councils These Councils have been set up in all departments of the plant for the Works and the Township as a whole and, lastly at the top management level where a Consultative Committee of Management provides a meeting ground for an exchange of views on the general working of the company and the industry

While much has been done to protect and promote the interests of labour, there is need for greater appreciation on the part of the unions of their responsibility Absenteeism is a problem in many industries and even a plant like Hindustan Machine Tools suffers from an absenteeism ratio of about 8 per cent despite the introduction of an attendance bonus. One reason cited by employers for absenteeism is the alleged ease with which workers are sometimes able to get medical certificates through the Employees Health Insurance Scheme doctors I was also informed that in certain cases, Government labour officers had intervened on behalf of offending workers against whom managements had taken disciplinary action in consultation with the local union. An HMT Union leader told me that absenteeism resulted from the fact that the workers did not get enough leave He said that the HMT worker was entitled to only 18 days privilege leave as against 30 days in other public sector plants In addition he was entitled to seven days casual leave, seven days medical leave and two out of 12 festival holidays on full pay

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they must be provided for elsewhere. To suggest that they should go to

lages to industries located in the city but in bringing industry to the village. This can be done.

The small-scale industry contemplated here is not the inefficient, subsidised unit that has [illegible] entumental and somewhat obscure [illegible] osed must [illegible] exponents [illegible] at Coim- [illegible] at Anand and among the *gramdan* [illegible] cientific approach and the application of modern technology.

Industry, even small industry, requires transport and power. Rural electrification must be given higher priority and the rural electricity tariffs that are at present among the more expens [illegible] rates m[illegible] while, a [illegible] of cow-dung gas plants also need to be explored

The programme of establishing industrial estates is eminently sound It should however [illegible] these estates [illegible] [illegible] The development of small co-operative industries also offers certain possibilities

The villages will have to go half way to meet this change. As the founders of the Vallabh Vidyanagar observe, the villages must be made habitable They must be provided with the minimum social, economic and cultural amenities that will enable them to attract the urban intelligentsia and retain local men and women of talent. This in turn can only be done if rural India is *served by doctors, teachers* [illegible]

The non-official agencies have a role to play in every aspect of development and the Government must readily come forward to accept their co-operation. Public co-operation has achieved remarkable results on the Kosi project, but the *gramdan* movement in Koraput has not received all the official encouragement it deserves

India's economic revolution [illegible] se is not yet wide enough and the mor[illegible] in relation to the problems it must so[illegible]

Bold and timely planning, a clear order of priorities and a clean, efficient administration are needed to carry through the revolution. The men and material resources are available They need to be mobilised and properly organised. Elimination of food imports and increased industrial [illegible] mselves transform the entire picture [illegible] reign exchange and prices. It would [illegible] Plan

Industrial discipline needs to be tightened and can only be tightened if the Government on its part treats the worker as a worker rather than as a voter Labour too must recognise that increased production and lower costs will benefit the working class as a whole much more than agitation

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AN AGRO-INDUSTRIAL SOCIETY

THE industrial progress of India over the past ten years has on the whole been satisfactory But Indian industry, as indeed much of the economy, tends *to suffer from a certain imbalance of bigness There* is a belief in some quarters that it is the big dam, the big plant and the big institution that really count and are necessarily the most desirable and the most efficient

This impression needs to be corrected The virtue of medium and small river projects has been realised, but the vast potentialities of *small, decentralised industry have yet to be properly discovered*

The development of such industry is profoundly important The present urban bias in administration and planning is tending to widen the gulf between town and country There is a movement of people with resources, education and talent from the country to the cities while doctors, teachers, extension workers and others are reluctant to serve in the villages largely because of the absence of amenities of various kinds

This one-way traffic is highly undesirable A widening gulf between town and country would not only operate as a drag on the progress of industry after a certain point, on account of an under-developed domestic market, *but would also create serious political problems that cannot be* overlooked

On the other hand the gulf could be narrowed if instead of concentrating industrial investments in and around the big cities and the new industrial centres, something more than a residuary interest were taken in trying to promote small, decentralised units for the processing of agricultural products as ancillaries to the large manufacturer and for catering to local consumer needs

This would lead to the evolution of an agro-industrial society in the countryside which would in turn, stimulate agriculture by planting new market outlets in the villages It would permit the utilisation of local raw materials *It would provide opportunities for the small man* It would create millions of new jobs And it would even out the existing economic, social and cultural disparities between town and country India would be a happier place *for such a change*

The problem of Indian agriculture is not to divide land among the people—this is only a limited, transient phase—but to take people off the land The landless labourer and the small peasant with an uneconomic holding account for half the agricultural population These people are *unemployed or* under-employed If the land cannot maintain them, then

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... Vidyalaya are rural universities that hope to turn out such people These institutions need to be multiplied

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The necessary momentum will only be gained if the whole nation is set to work without limitations of ideology Socialism is a worthwhile objective, but mere distribution without production is not going to satisfy anybody Distribution logically follows production and cannot precede it This obvious truism is not yet universally understood

Political leadership at all levels is needed to put the revolution in higher gear Unfortunately political vacillation, lack of clarity of purpose, the scramble for power within the ranks of the ruling party and a certain pandering to parochial interests have ill served the Plan and tended to demoralise the administration

However, much has been achieved Much more remains to be done In the task that lies ahead, the nation can draw strength from the small and great projects that unknown Indians have laboured to complete—Bhakra and Bakshi-ka-Talab, Sindri and Neyveli, Anand and Rourkela and all the other names in the long roll call of battle-honours of the New Republic



GLOSSARY

Acre-feet	A measure to express the amount of water needed to [illegible] foot
Adirasi	[illegible] n for the [illegible]
Ashramedha	*Ancient* practice under which a new ruler despatched a horse in procession through the domains over which he claimed sovereignty, free passage to the horse implying submission to the monarch. The ritual was completed with due ceremonies including sacrifice of the horse
Ayacut	South Indian term for the area commanded by an irrigation project
Bundh	Embankment
Betterment	The enhanced value of land from local development such as irrigation. A betterment levy is a tax on the betterment value designed to reimburse part of the capital cost of the improvement effected
Bharat Sewak Samaj	A non-political non-official body started a few years ago to undertake constructive development activity
Bhoodan	A land gift movement inspired by Acharya Vinoba Bhave
Command Area	The area that can be irrigated by a given project
Cusec	The volume of water flowing past a given point in terms of cubic feet per second.
Firm power	The *minimum* guaranteed supply of hydro-electric power representing the lowest quantum in the scale of seasonal fluctuations. It therefore represents only part of the installed capacity
Gramdan	A higher form of *bhoodan* in which the entire village is gifted to the community
Head (of power)	The drop in elevation available for letting down water to generate power
Kans	A deep-rooted weed-grass
Kharif	The monsoon crop season
Mandi	Market
Rabi	The winter crop season
Samiti	Committee or Council
Shramdan	Voluntary labour (literally labour-gift)
Taccavi	Agricultural loan given by the Government for development and distress-relief
Terai	The slopes along the Himalayan foothills, usually under very thick jungle and grass